MODERN PLASTICS

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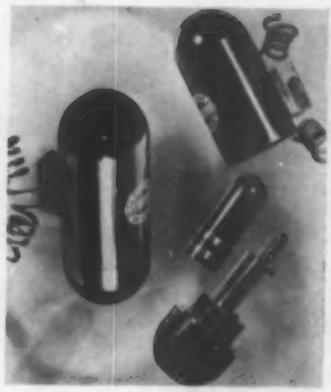
Of General Interest

Technical Section

News and Features



Next Month

A short informative article about choosing special phenolic materials for moldings likely to encounter uncommon demands in science has been written by Franklin E. Brill of General Plastics, Inc. It is illustrated with actual examples and a chart of special property materials which he recommends for certain applications. Donald R. Dohner, whose article in the March issue so clearly indicated the necessary steps to be taken to obtain successful industrial design, will tell something about how this subject is handled by students at Pratt Institute where he heads this department of instruction.

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MODERN PLASTICS
APRIL 1937 VOLUME 14 NUMBER 8

PLASTICS WILL CHANGE AUTOMOTIVE DESIGN

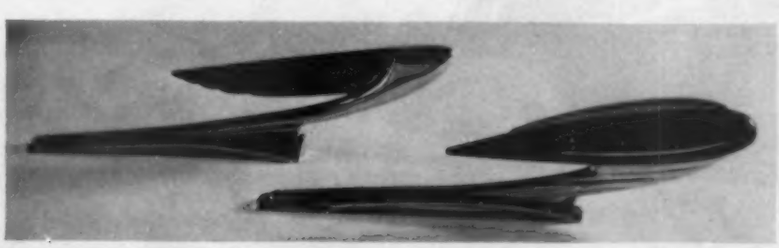
by J. EDWARD SCHIPPER
Hudson Motor Car Company

Hudson Motor Car Company, among other automobile manufacturers, is experimenting with plastics for uses which today are not common. Their views, expressed by an executive of the company, indicate their trend of thought

KEENLY AS THE BEAUTY AND UTILITY OF plastics have been appreciated by the motor car industry, the real story has only begun. Although many forms of plastics for automotive use are now in production, the future presents a far more fascinating and dramatic picture of the possibilities of these materials. It is not exaggerating in the slightest to say that the entire appearance of the car, both interior and exterior, is likely to be affected radically by the ultimate use of products which fall under the broad classification of plastic materials.

For instance, those who are working in the body division of the automobile industry are fully aware that two important developments are just around the corner. These are concerned with transparent products which can be substituted for glass, and also the great variety of uses for some of the new adhesives which are being developed. The interesting feature of these new plastic products is not so much that they are better than previously used articles which they are designed to replace, but that they permit certain designs which have been in the dream stage to be practically achieved.

As a good example of one of the anticipations of body engineers, we may take the matter of "plastic glass." We are all fully aware of the fact that because of production costs, it is necessary to keep the transparent window surfaces of our cars absolutely flat. These flat surfaces do not blend into the streamlining of the body any too well. They force compromises and interruptions in what we know to be the best streamline design and, consequently, result in wind roar and suction at the wrong points. A good example is the tendency which may be noted in some of our late type of bodies for snow or dust to be drawn around the rear windows or



Cast resin radiator ornaments on 1937 Hudsons and Terraplanes

lights of the body, destroying the visibility at this important point, and also indicating very clearly that suction or drag has been created. Automotive engineers are aware of the fact that "wind roar" comprises by far the greater part of car noise above 40 miles per hour.

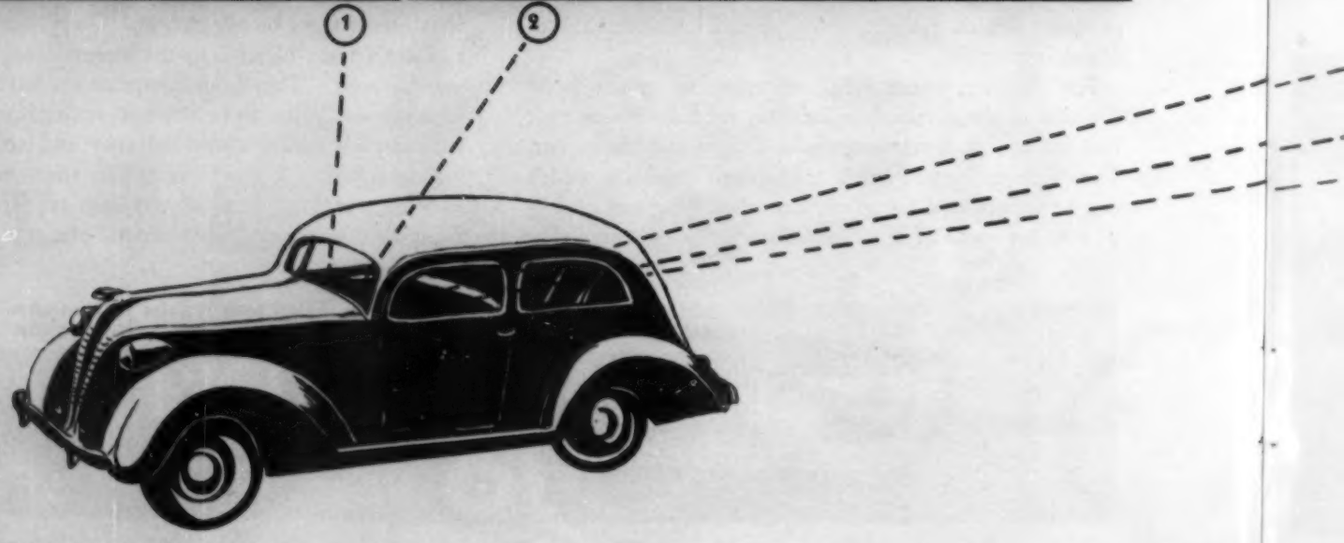
When "plastic glass" is finally developed to the point where scratching tendencies are eliminated, it is going to be possible to blend the curvature of the transparent plastic to the ideal form of the body, thus cutting down noise and suction, and permitting the development of a superior contour. There is no doubt but this will result in striking improvements in appearance as well as elimination of noise.

Another fascinating glance into the future is afforded by the multitude of uses that some of the new plastic adhesives are bound to have. Frank Spring, engineering stylist of the Hudson Motor Car Company showed us recently some beautiful examples of thin veneer ($^1/_{100}$-inch thick) bonded to metal by means of some of the recently developed resin-bond material. The advantages of a material of this kind are obvious. Not only is the strength of the metal present to furnish the desired rigidity and silence, but the actual natural grain of the wood in its original form is so far superior to even the finest graining on metal that there is no comparison. The use of this bonded material for instrument panels and even body interiors opens up new possibilities in luxuries and beautiful appearance at practically no increase in cost.

Just as another example of a very definite practical use for body interiors, is the use of plastic glues for embossing upholstery. Mohair, Bedford Cord, and other upholstery materials are backed with impregnated linen and pressed over a die to the required embossed form, resulting in a clean cut permanent embossing which adds to the richness of the car interior.

One of the most encouraging tendencies to be noted in plastics of many kinds is their increased durability and imperviousness to weather and climatic exposure. This is going to greatly increase the use of plastics in the automobile field.

We are using on the Hudson and Terraplane cars this year, a number of attractive as well as useful examples of plastics. The Catalin radiator ornaments, which

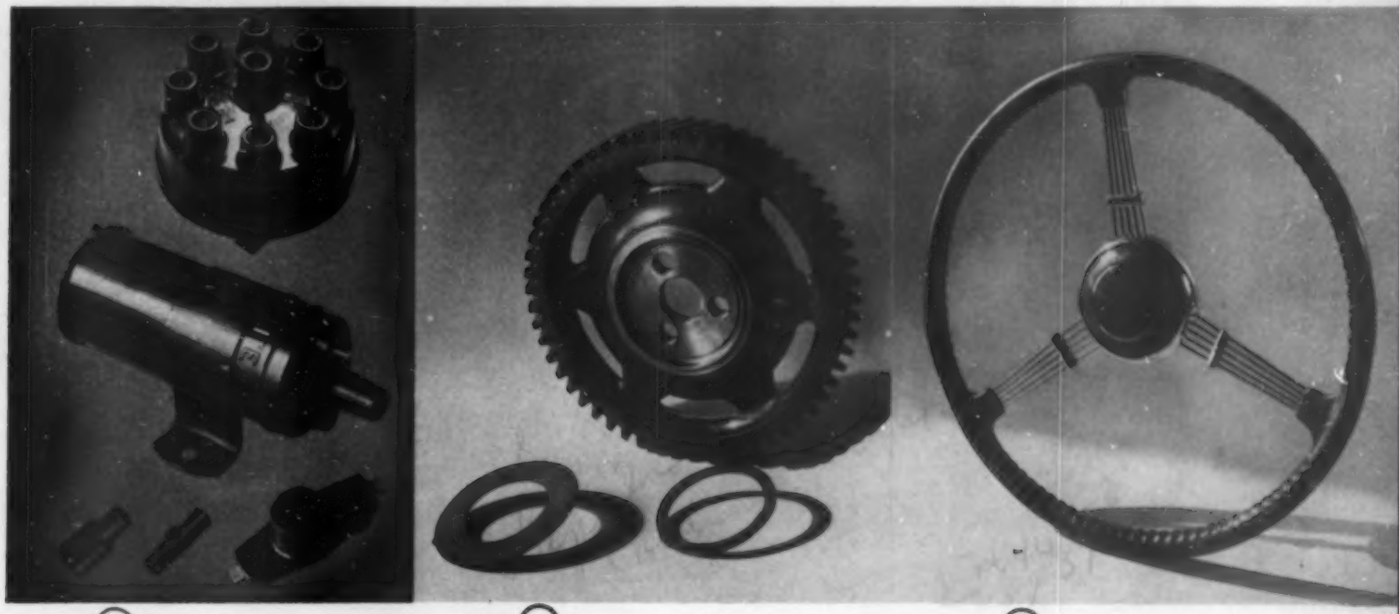


are machined to a smooth finish, and colored to a shade which harmonizes or contrasts with the body color, have proven a distinctive feature of Hudsons and Terraplanes for 1936 and again in different form for 1937.

The Hudson Motor Car Company was one of the first users of the impregnated fibre gear. The use of fibre gears is now old in the industry and has proven very successful. The material, of course, is phenolic impregnated fabric. Bakelite and other phenolics are also used for a great many electrical parts such as connectors, distributor head, coil head, etc. We also have phenolic impregnated fabric washers which act as grease retainers capable of taking a fair degree of thrust.

From the standpoint of interior trim, the Hudson Company is using a great deal of Tenite, both in the Hudson and Terraplane cars. This material is a cellulose acetate compound, molded to form, and is very satisfactory, not only from an appearance standpoint, but has plenty of physical strength to stand up permanently for use in unstressed parts. Some excellent mother-of-pearl effects have been achieved in its coloring as used in the interiors of Hudson and Terraplane closed cars. The horn button on the more expensive models blends with the steering wheel, which is of Tenite molded around a steel frame. Garnish moldings, cover plates, switch handles, knobs on interior hardware, etc., match well with the upholstery and give a quiet luxury in the interior which has been favorably commented on by the trade and public alike. For electric light fixtures, the Hudson Company is experimenting considerably with Beetle.

Of course in the field of lacquers, events are transpiring so rapidly that none of us know what may be on the market a few months from now. The developments in Tung oil and Soy bean oil lacquers are extremely rapid. We are anticipating, as a result, finishes which are not only more permanent but better appearing and more readily worked with in the plant. The matter of inlaying metal into molded plastics is another interesting feature which will be utilized to a growing extent in the automotive industry for car interiors. In a nutshell, it can be readily said that as far as automobile work is concerned, any part which can be made from a plastic will be thus made.



1. Some of the acetate molded parts used in Hudson and Terraplane interiors. 2. Above, left; horn button—pearl finish, right, shifter lever ball. Below; a teleflash system is part of this Terraplane instrument panel. The large center piece is the speedometer and surrounding it are the gasoline gauge (upper left), water temperature indicator (upper right), and the teleflash gauges (lower right and left) which tell in large red-lighted words if oil pressure is down, or if electrical disorders develop. 3. Bakelite parts, including distributor head, coil head, distributor rotor, and connections. 4. Leminated Celeron gear and thrust washers. 5. Tenite steering wheel and horn button which are standard equipment on all Hudson models

MOST FIREPROOF SHIP AFLOAT

by J. PHILIP KIESECKER

Mr. Kiesecker was retained by the Maryland Drydock Co. as consultant on fireproof construction and to design the architectural treatment of the vessel. He was also responsible for the interior furnishings and decoration. *Editor*

NEWS SOURCES IN FEBRUARY REPORTED THE sailing of the first all-fireproof passenger vessel reconditioned under the latest requirements of the U. S. Department of Commerce. This vessel, the S. S. "Catherine" owned by A. H. Bull & Co. was recently completely reconditioned at Baltimore at the works of the Maryland Drydock Co., a subsidiary of Koppers Company.

The owners authorized the complete reconstruction of this ship in order to obtain in a short time, a passenger and freight vessel needed in their Inter-Island trade in the West Indies for the run between Porto Rico and the Virgin Islands. The aim of the owners, carried out under the direction of Gibbs and Cox, Naval Architects of New York, was to provide a vessel equipped in excess of government requirements even before the findings of the Technical Commission appointed by Congress were enacted into law. The structural integrity of the ship was increased from one compartment, required for this type and size, to a two compartment vessel.

The main problem was to provide a substitute for wood in the form of a compressed fireproof sheet material as an outer surface for interior steel structure in working and public spaces and to properly support such

1

1—The fireproof treatment accorded the public rooms on the S. S. Catherine detracts neither from their comfort nor appearance. This Smoking Room has colorful drapes, and a touch of Old Spain is indicated by its wall lanterns and ornate doors. 2—Unburnable plastic table tops, restful lighting, original decorative treatment and mirrors which give scope to the area, feature the Dining Salon. 3—Fireproof safety and comfort dominate the standard Staterooms. 4—High-lights from below make these Spanish dancers on the Bar murals appear to be actually dancing on light. 5—Walls and doors of compressed asbestos surfaced with phenolic resin make de luxe Staterooms unburnable. 6—The art of Old Spain influences the Lobby decorations.

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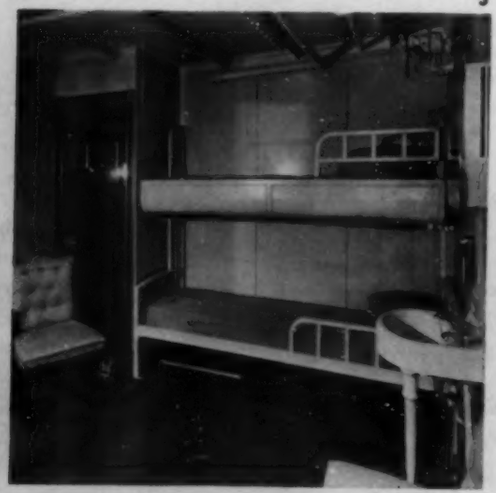

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material when used as free-standing, light weight divisional bulkhead for staterooms and other spaces; also adequately protecting the light weight supporting steel members in such bulkheads, by the use of similar fireproof material, to prevent their distortion and collapse in case of fire.

The design adopted accomplished this end to a degree of fireproofing not previously obtained. Less than one percent of wood was used, although a surface allowance of ten percent was permissible within the structure of the ship, if applied to fireproof material, under the latest U. S. requirements. The fireproof material used is a product of the Johns-Manville Company, who has done extensive research work in this field.

One of the questions which had to be decided was the type of surfacing material which should be adopted to cover fireproof doors, built-in furniture in public spaces and staterooms, pilasters and columns, wainscots on stairways, etc., to obtain the proper architectural appearance, and still avoid any material which might support combustion. In the interior design laminated plastic, one-sixteenth of an inch thick, was used for the purpose with satisfactory results. This material meets a condition on shipboard which is of great importance to the owner; namely, minimum upkeep, especially in this case as the vessel is on a run where facilities for overhauling are limited. It will probably be unnecessary to recondition the laminated plastic surfaces during the life of the vessel.

As a veneer surface, the laminated plastic was a decided advantage because it strengthened the flush door panels to a much greater extent than a thicker veneer in wood would have accomplished, and in addition, provided a high grade finish impervious to wear and atmospheric conditions to a degree which could not be duplicated by the application of any known paint or varnish. Then, too, being a finished material when purchased, time and labor were saved in its application by the elimination of any painting or finishing operations. Incidentally, the tar base which makes plastics possible is produced by Koppers Co., and the Maryland Drydock Co., a subsidiary, was the first to make such extensive use of plastics in fireproofing a passenger vessel.

The usual veneer processes were employed except that the laminated plastics, wherever used, were applied in most instances to fireproof panels made from asbestos compounds, instead of plywood. The manufacturers of the fireproof panels claim that the material is free from expansion and contraction and is also non-hydroscopic.

Only solid colors, which harmonized with the architectural scheme, were used in the laminated plastics with no imitations of wood or other substances. The appearance of wood anywhere in the vessel was limited as far as possible, however harmless in amount, consistent with practical considerations. It was found in most instances, that laminated plastics made from natural resin was easier to keep flat and apply to the panels than resins to which certain pigments had been added to obtain a specified color. The latter were much harder to apply, seemed more brittle, and showed a greater tendency to warp in experimental applications.

A point of interest, especially (*Continued on page 72*)

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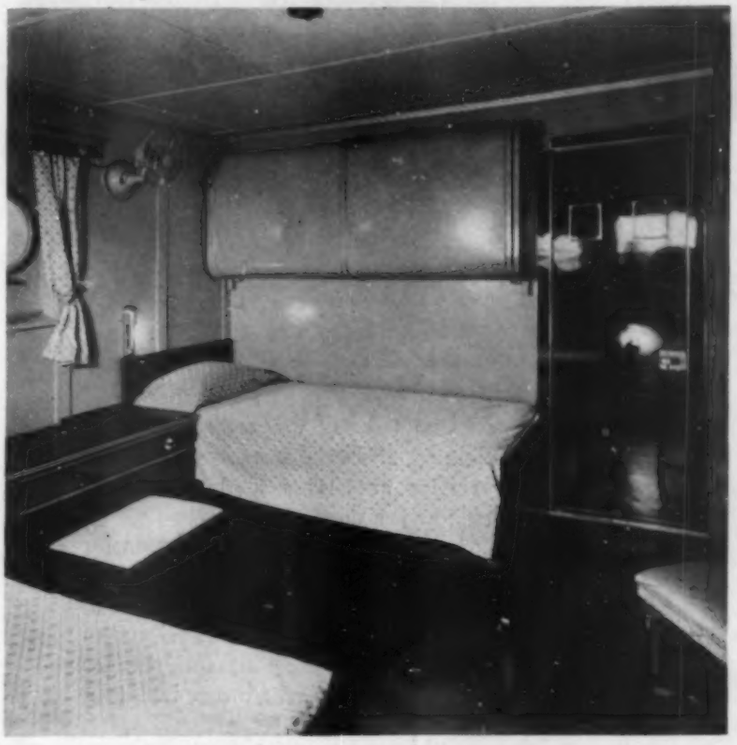

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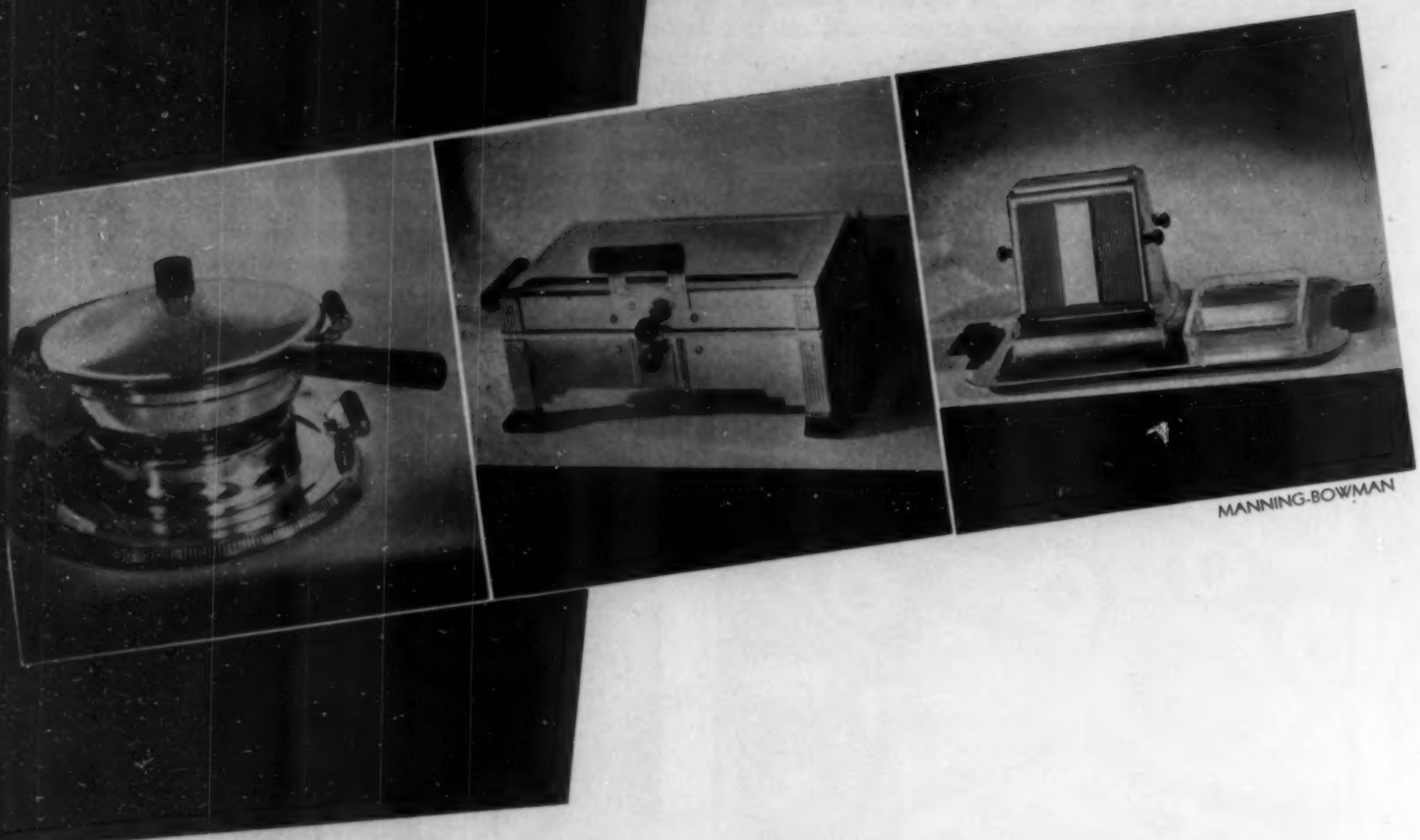


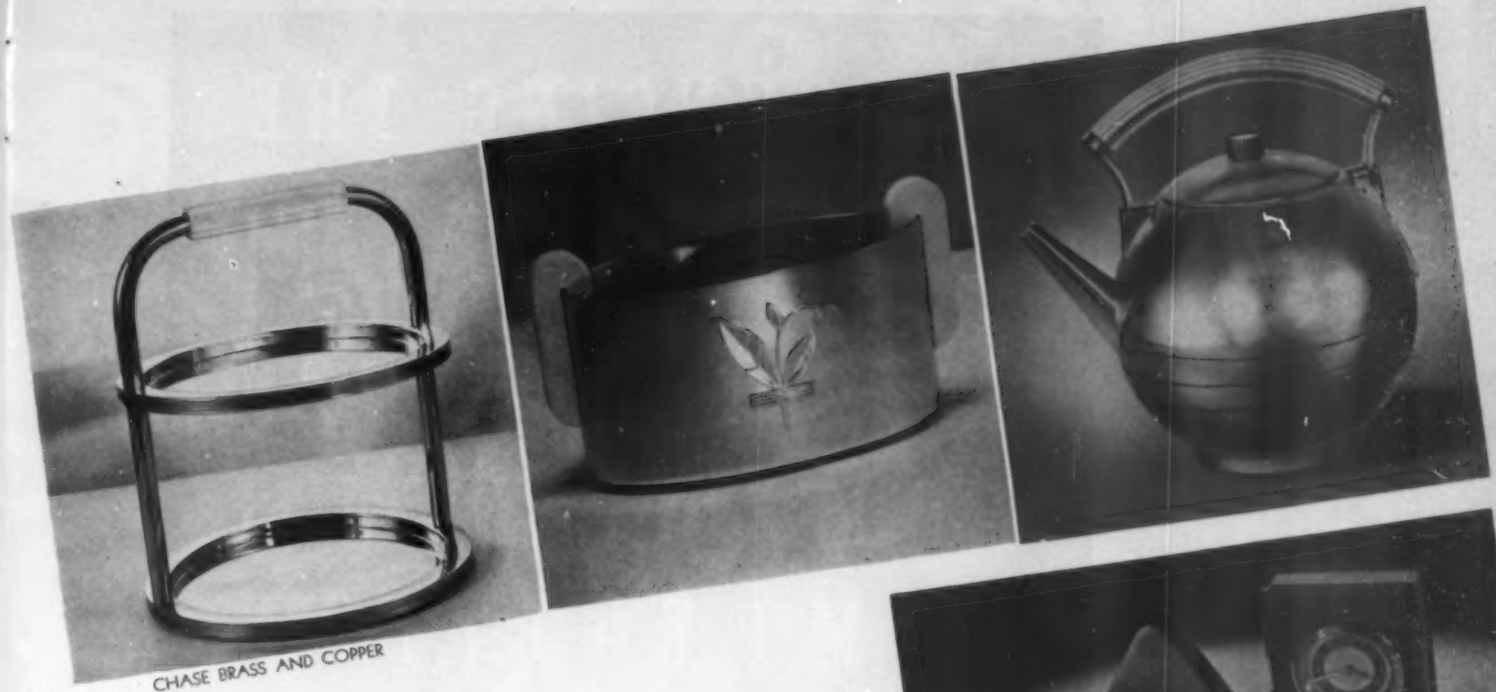
GIFTS, FOR ALL-YEAR GIVING, CONTRIBUTE A great deal to the total volume of retail sales. In appreciation of this fact, they are being created and designed with more intelligent thought and the useless gadgets which prevent a decent turnover in this type of merchandise are on the wane. These things "to be given away" at weddings, anniversaries, birthdays and such have taken a practical turn which makes them truly acceptable.

Manning-Bowman & Co., believing that electric table appliances should be of uniform, harmonious design, the same as silverware, glassware, linen, etc., originated some two years ago a series of electric appliances in matched patterns. Their Harmony pattern, the original electric service of matched appliances, is designed in classical style and features chromium finish with contrasting black plastic handles, knobs and feet. This plastic trim not only adds to the beauty of the pieces but is self-insulating and heat-resisting as well. This line is aptly styled by Jay Ackerman.

The three pieces pictured above reflect the simplicity and charm of these matched patterns. The chafing dish is equipped with two heating units and a water pan as well as a cooking pan. The cooker is a compact electric table cookery that bakes, grills, steams, fries, roasts, toasts, broils and boils. The ensemble includes the cooker with plain cooking grids, the lower one of which has a grease drain; interchangeable waffle grids; a special oven that performs all the cooking tasks of the ordinary kitchen range; and a complete set of special cooking pans. The competent toaster service contains a toaster, tray and crystal glass marmalade or jam dish.

Timely gift items, designed by Walter Von Nessen for Chase Brass & Copper Co., are fashioned from chromium, copper and brass with ivory or white plastic handles and knobs. The Two-in-Hand tray, of polished chromium with white handle, is a conveniently arranged duplex tray which requires but small space on table or buffet for serving two kinds of food at one time. The Oval Cigaret Holder conspires to keep cigarets and matches in one place. The space for matches is in the center, making a division for two brands of cigarets. This is available in chromium or brass with white handles. A tea kettle equipped with an electric heating unit is handy for making tea at the table. Spherical in shape, it has a fluted handle that follows the contour of the kettle.

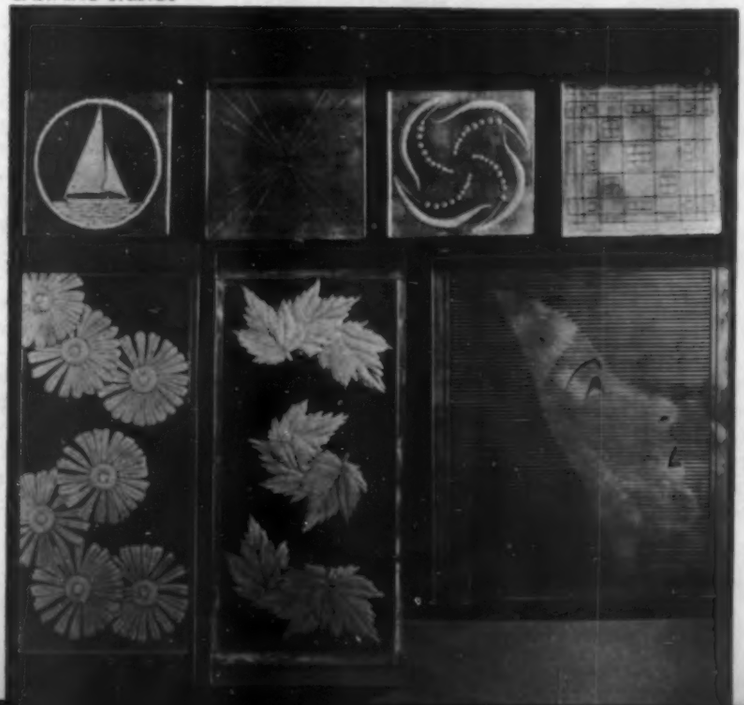
Simon Bros. are comparatively new users of cast resins although they have been associated with the gift business for a number of years. Practical items are the basis of their choice for plastic fabrication and they have developed quite an extensive line of small clocks in various colors and designs as shown by the group at the extreme right, together with other items such as the powder box at the extreme left front and smoking accessories. This line has been created with an eye to the premium business.



CHASE BRASS AND COPPER

Perhaps the most outstanding use of plastic materials at the recent New York Gift Show was made by Castaing Studios. Mr. Castaing has created an unusual effect on tiles and trays by hand-engraving on the back of Trafford. Designs are clean, simple and definitely the work of an artist who has a keen appreciation of the effects he wants to obtain, and the knowledge and courage necessary to obtain them. Translucent Trafford is used in the examples illustrated below, and the items have an appearance of etched glass with the added advantages of low price and great strength. The wall plaque at the right is etched in the same manner with black lacquer wiped into the engraved lines in the back. In addition to these, Castaing makes a number of colorful items in Trafford, such as playing card holders, cigaret and match sets, candle holders, etc., which can be retailed at popular prices.

CASTAING STUDIOS



SIMON BROS.

ANNOUNCING THE SECOND MODERN PLASTICS COMPETITION

Since our 1936 COMPETITION, plastics have been adapted to many new uses where they are rendering splendid service and proving their worth as fundamental materials. New plastics have been developed to the point of production and have taken their places in the front ranks of our industrial progress. Industrial and engineering design has merited and gained greater recognition and respect and is no longer considered a thing apart from successful manufacturing and merchandising plans. Design, in this sense, is not restricted to line and form alone, but includes functional planning and the engineering skill requisite to the proper choice of materials and methods for appropriate and satisfactory applications.

MODERN PLASTICS COMPETITION last year focused the attention of all industry upon the importance of these modern manufacturing materials. The exhibit was recognized as the most complete assembly of molded, laminated and cast plastics ever displayed. Manufacturers, designers, architects, and laymen came by thousands to witness the progress these materials have made in our industrial structure. They were impressed and inspired by the tremendous potential opportunities offered to improve production and acceptance of manufactured goods.

The SECOND MODERN PLASTICS COMPETITION will focus the attention of industry upon the new uses and new materials which have entered all manufacturing fields during the past year. It offers designers, engineers, architects, materials manufacturers, mold makers and industry in general an opportunity to exhibit their skill and ingenuity in applying these modern materials to the improved technical construction and increased functional design of their products. It offers them an opportunity to gain authoritative recognition of their work and the incidental favorable publicity which is bound to result.

Entries will be assembled under four groups of classification this year instead of three. Each group will have its separate board of judges chosen because of their broad experience in that particular field.

Important in the consideration of entries will be the inclusion of all facts pertaining to their inception, development and results obtained. These statements of fact should be brief and to the point and should be supplemented with blue prints or sketches where such may be considered helpful in clarifying details of function and design. Such facts will be of inestimable value in the deliberation of the judges and will simplify the subsequent announcements of their decisions. Therefore, a request is made of each entrant for a summary which will state the aims and objectives of the design submitted, what was sought and how accomplished, whether it was an original or a redesign, with, if possible, a statement of its effect on sales and production problems—or other functional advantages gained through its adoption.

Details of the COMPETITION follow, and an entry blank is included with this issue. An early response from those who contemplate entering designs will be appreciated. The board of judges for each of the four classifications will be announced in a later issue.

Entries in THE SECOND MODERN PLASTICS COMPETITION will be accepted from now until September 15th and must be confined to those plastic parts which have been designed or completed or placed in production since August 15, 1936. No entry fee is required but it is understood that all parts will be submitted in their completed form and that all entries will remain the property of MODERN PLASTICS unless definite arrangement is made in writing for their return at the time of entry and will be placed for exhibition in the PERMANENT PLASTICS EXHIBIT at 425 Fourth Avenue, N. Y. C., from October 1, until December 1, 1937.

Any number of plastic parts or designs may be submitted in the Competition by the following: A—Manufacturing companies making use of the design entered; B—Manufacturers supplying the plastic material from which the designs were created; C—Molder, fabricator or laminator who produced the object entered; D—Machinery or tool manufacturer whose equipment was used in producing the entered designs; E—Independent or company engineers or designers responsible for the submitted design.

Groups or classifications comprising MODERN PLASTICS COMPETITION consist of the following:

1. Industrial—for the outstanding industrial achievement in which plastics were a major factor.
2. Scientific—for the most ingenious use of plastic materials in the development or promotion of science or scientific apparatus.
3. Style—for the smartest adaptation of plastic materials to style merchandise within the form of wearables and accessories.
4. Decoration—for the most appropriate application of plastics in architecture, interior decoration or design, furnishings, fixtures, household utensils, etc.

Awards. Judging of entries will take place immediately after the closing date and the awards will be announced in MODERN PLASTICS November issue together with a complete story and illustrations of each winning design. MODERN PLASTICS PLAQUES OF AWARD will be given to the companies sponsoring the first, second and third entry receiving highest ratings in each classification. Recognition also will be given to the individual engineer or designer responsible for creating the entry, as well as to the molder, fabricator, laminator, material and equipment manufacturers participating in the winning entries.

The actual plastic object, accompanied by an entry blank, must be sent. Only in the case of architectural and interior designs will photographs be acceptable for consideration.

Please see that ALL information requested on the entry blank is given in detail—particularly the summary relating to the aims and accomplishments of the design. Submit as many entries as you like but each must be accompanied by a separate blank. Additional blanks and further information may be obtained by addressing MODERN PLASTICS COMPETITION, 425 Fourth Avenue, New York City, N. Y.

THE SECOND MODERN PLASTICS COMPETITION

(EDITORIAL COMMENT)

IT IS WITH GENUINE PLEASURE AND SATISFACtion that we announce on the two preceding pages The Second Modern Plastics Competition.

We have been told that our 1936 Competition was the most complete showing of plastic parts ever assembled at one point. We have been told, too, that it was the most helpful gesture ever undertaken within the plastics industry. We are naturally happy to initiate an event of such potential opportunity.

BUT—FOR WHOM DOES THIS OPPORTUNITY exist?

There can be but one answer to that! It exists exclusively for those who enter the competition and take full advantage of it.

It gives designers and engineers recognition of their work in these new materials and helps them become better known to industry and among themselves.

It provides opportunity for manufacturers of many commodities to exhibit the skill and craftsmanship of their organizations and gives them additional contacts with thousands of individuals who are in a position to use their product, or to be helpful in its production.

It offers molders, laminators, and fabricators an opportunity to display their plastic products to industry. And to demonstrate their individual ingenuity and skill.

It offers manufacturers of plastic materials an opportunity to display their wares in completed form. And to prove beyond any shadow of doubt that materials are available for every sort of industrial and decorative application which may crop up in planning production.

TO ALL THESE, IT OPENS A WIDE AVENUE OF publicity with immeasurable benefits by focusing the attention of our readers, and those readers of other publications which devote a great deal of space to announcing and reporting the Competition and its results, upon the industry and its accomplishments during the past year.

IT IS THROUGH COMPETITIONS OF THIS SORT that leadership is established in every industry. And leadership is generally translated into dollars and cents profit by additional business attracted to the concerns who establish it. Leadership brings more tangible results than prestige alone. It creates confidence and respect in the concern whose courage and initiative prompts it to step ahead of the crowd. It attracts its full share of favorable comment by those in a position to do it the most good. It obtains word of mouth publicity which can be obtained in no other way.

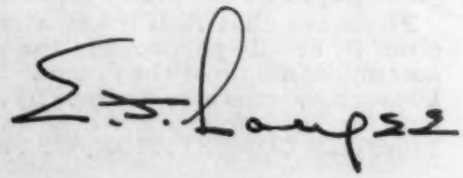
Individual designers and engineers, like sculptors and painters, become famous through such exhibitions of their integrity and skill. Creative genius is always evident in competitions of this sort and there are those present among the observers who will recognize and employ it.

THE COMPETITION PROVIDES OUR READERS who are definitely interested in plastics and their uses with an opportunity to examine in concrete form the many developments that have been brought about during the past year. It gives them a chance to feel and handle these products and to ask questions about them in order that they may better understand the problems of fabrication and the advantages and limitations of the materials. To study them first hand, and to decide in what ways they can best employ them in their own manufacturing and experimental work.

THIS OPPORTUNITY IS YOURS FOR THE SIMPLE effort of making entries in the Competition. It costs nothing more. The more entries you make, the greater are your chances of recognition and reward. The more entries you exhibit, the more times will your name and your product be brought before those who visit the exhibits at the close of the Competition.

Last year there were just under one thousand entries. This year we expect to have more than twice that number. We have planned accordingly. We shall expend a great deal of effort and money to promote the event and to assure its success. We shall devote much space in our publication to tell our readers about it. We shall picture the winning entries in our November issue which will be devoted almost exclusively to the results of the Competition and to those whose entries have made it possible.

WE MOST CORDIALLY INVITE YOU TO PARTICIpate in the Second Modern Plastics Competition and heartily urge your cooperation in getting entries here as early as you can in order to relieve, and avoid if possible, the last minute avalanche which swamped us last year.



The molded developing tank may be seen at the upper left. The camera back and cover of the developing tank are shown below. The assembled camera is compact and sturdy, easy to carry and use

DEVELOPS FILMS, TOO

The molded parts of this camera and its developing equipment are largely responsible for its efficient operation, and for the low price which assured its selling success

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THE POPULARITY OF SMALL CAMERAS WHICH HAS INtrigued amateur and professional photographers both here and abroad can be traced quite directly to the fact that small photographs are not expensive to make. Cameras, of course, may cost anywhere from one dollar to one thousand, but the photographs themselves need not be expensive and results from inexpensive cameras are frequently surprising. Much of the fun of photography lies in experimentation. Oblique "shots," deep shadows, unusual lighting and uncommon scenes, all contribute to the experience and satisfaction of the amateur, and to the fame of the professional.

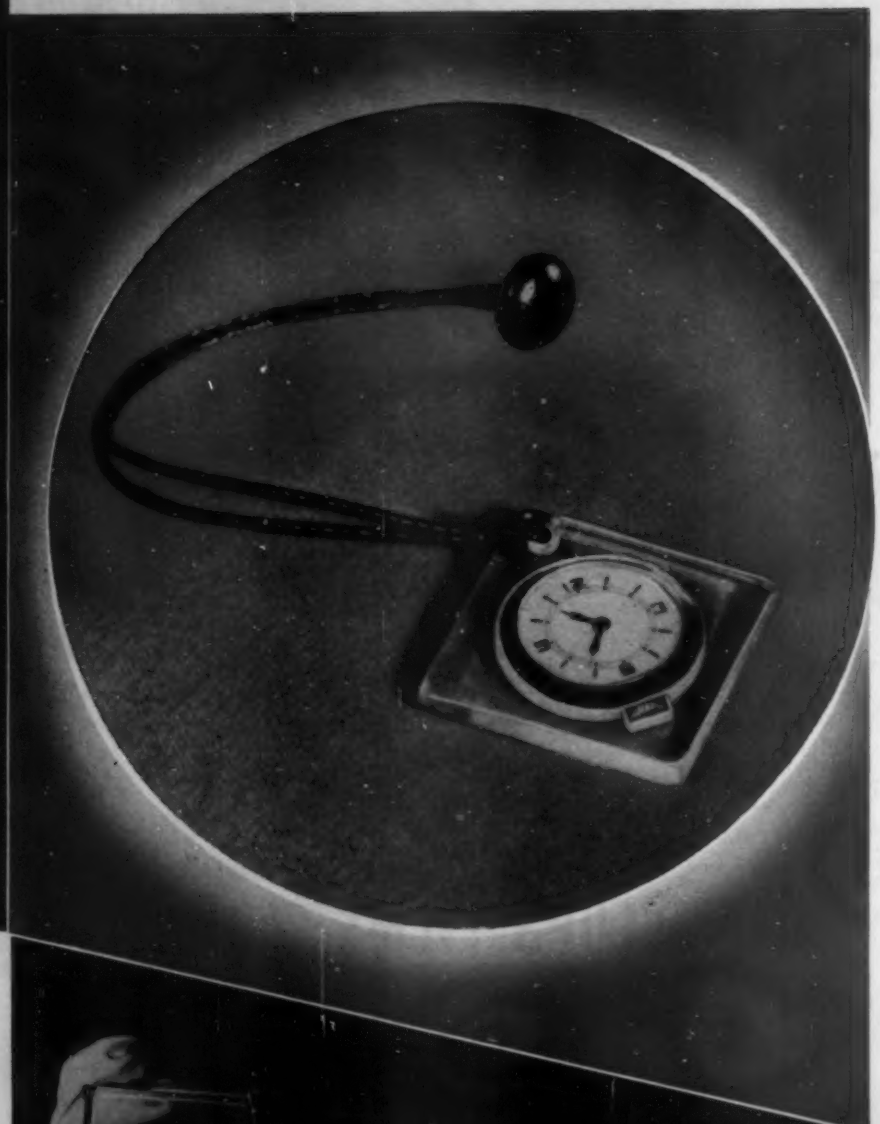
More fun and satisfaction can be derived by developing, printing and enlarging the photographs made. And incidentally, much of the expense of photography may be reduced in this way and the money thus saved can be used to purchase additional equipment. It was with this in mind that Herman Casler invented the Photo-See Camera and Developing Tank pictured here. He spent three years in the development and ultimate perfection; the desired result being finally achieved with molded plastics.

Molded plastics have been responsible for numerous innovations in camera construction during recent years resulting in a greater demand, due largely to the new compact cases which are lighter in weight and lower in cost. An original development in molded plastic units for photography is found in the rather amazing Photo-See Camera and Developing Tank, which is a two-piece unit designed primarily for amateur use. It actually develops, in from five to ten minutes, the snapshots and time exposures it makes. Perhaps the most surprising feature is its simplicity of construction and operation.

At its introduction during the recent holidays, department stores conducted demonstrations that attracted large crowds of interested spectators eager to see the new camera and developer in actual use. There, before their eyes, pictures were taken, developed and enlarged to demontrates the quality of the photography of this little camera, which is surprisingly fine. Children and adults were amazed at the startling speed with which the operation was completed. In actual use, by thousands of present owners, remarkable results are being obtained.

The developing tank is molded almost entirely of plastic material, and the film cartridge of the camera is likewise a plastic molded part. For both camera and developer, a light-proof, light-weight material was essential, with molded color being an important consideration. The developer, a miniature portable *dark room*, required a material (*Continued on page 70*)

B. ALTMAN

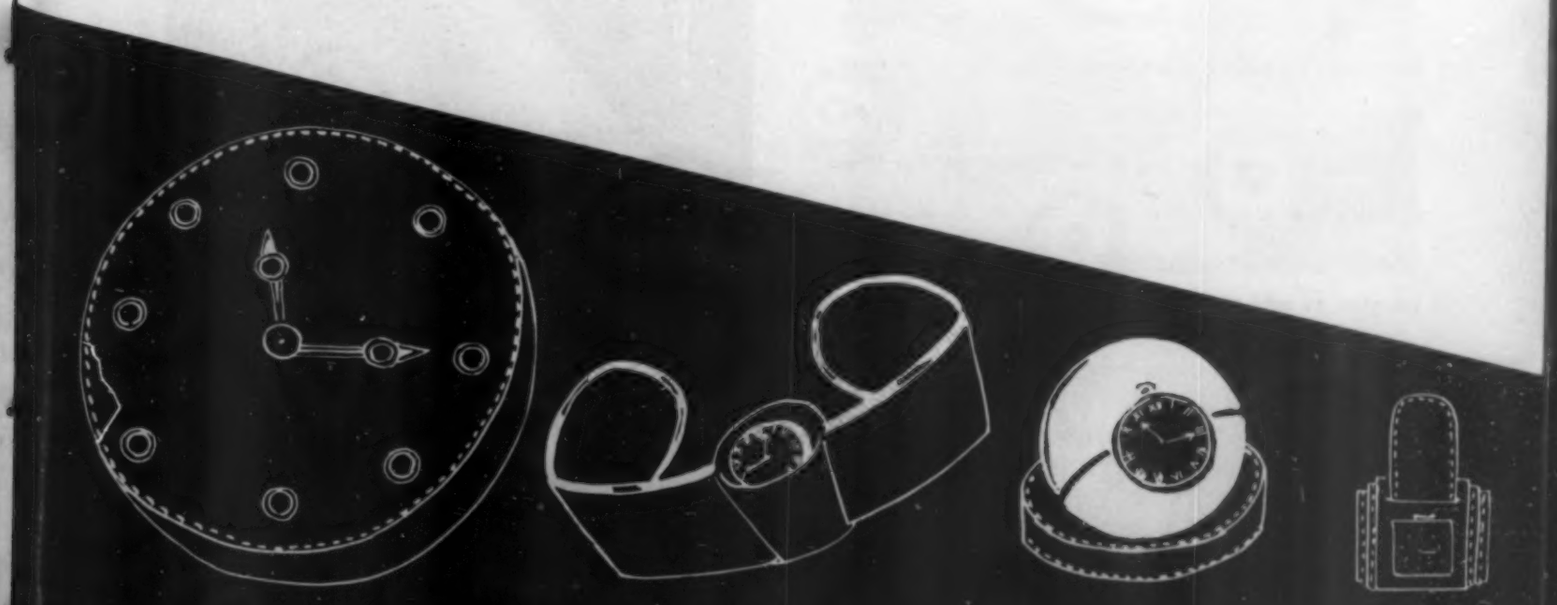


SPRING TIME

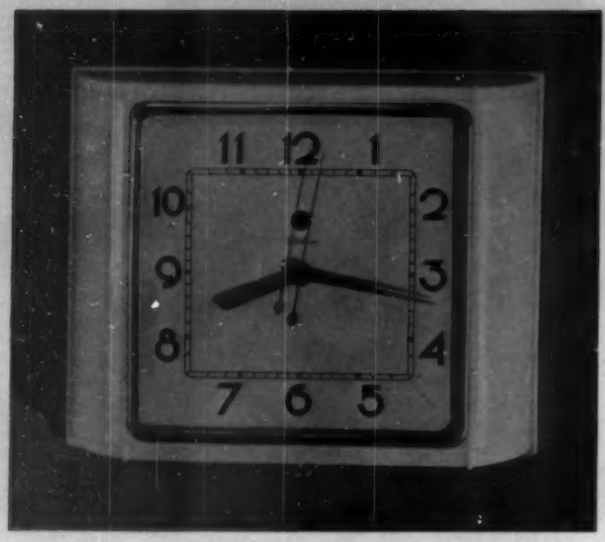
by EVE MAIN

American designers have taken time-pieces by the forelock and have created new settings and combinations that are both good to look at and pleasant to use. They have chosen plastic materials to give color and sparkle to timely accessories to be worn or carried in purse or pocket. Silver flecked transparent prystal forms a jewel-like border for a miniature purse watch. A wide gold bracelet flaunts a tiny watch set into a square cast resin frame, and a translucent shell plastic bracelet becomes an appropriate setting for a small gold watch. A transparent cast resin cigaret-watch case, trimmed with gold metal, not only tells the time of day but also shows at a glance the status of the cigaret supply. The ever-popular lapel watch reaches a new high in its square frame of translucent plastic. (Photographs courtesy Catalin)

News flash from Paris: Hermes contributes several cleverly designed watches and clocks to accompany travelers. A bracelet watch decorated with black enamel is set into colored plastic material. An oval plastic-mounted watch has a hand-sewn pigskin case. A novel clock entirely covered with pigskin—even the dial—has eyelets through which the figures are seen and both figures and hands of the clock are of bright colored plastic material. A traveling watch with plastic mounting is set in a pigskin case resembling a small folding purse. (Sketches courtesy du Pont Paris office)



PLASKON



WALL CLOCK:

Warren Telechron's gay timekeepers have long metered out correct and synchronized time in the various rooms of countless homes. And not the least important clock in the well ordered household is found in the kitchen, for time is important when the roast is in the oven. Telechron's "Kitchen-guide" is a clean, square wall model, in either green, antique ivory, or white, so that it can be selected to harmonize with the rest of the room. It's a perfect clock for the bath room, too.

Clock manufacturers use Plaskon for cases because Molded Color makes for efficient manufacturing—and because people buy the clocks. Northern Industrial Chemical Company of Boston is the molder of this casing.

Have you yet written to be placed on the free subscription list to receive all issues of the four-color Plaskon Fortune reprints? Do it today. We'll be glad to add your name.

REFRIGERATOR DOOR HANDLE:

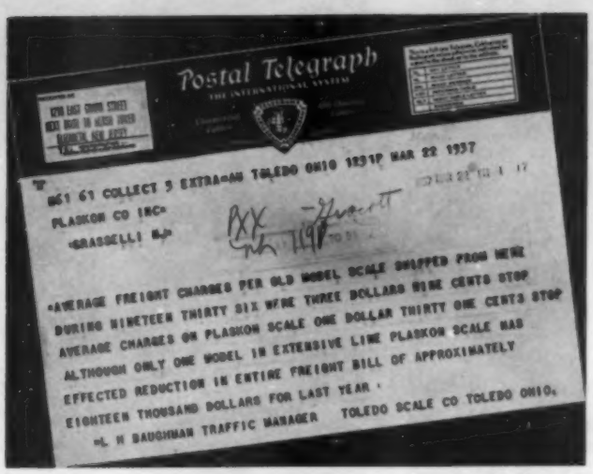
Handles, door knobs, drawer pulls and the like, are perfect applications for Plaskon. They dress up the product, are wear proof and warm to the hand. Unlike handles of finished metal and wood, which they are largely replacing, Plaskon handles will not chip nor peel.

Servel, Inc., has adopted Plaskon door handles for use on their Electrolux Refrigerator. By combining a white Molded Color handle with a chromed metal escutcheon, they have developed a distinctive and practical unit.

Incidentally, there are scores of stock Plaskon handles, knobs, etc., available which we will gladly tell you about on request.

The Electrolux handle is molded by National Lock Company, Rockford, Illinois.

APRIL 1937



Postal Telegraph

THE INTERNATIONAL SYSTEM

NC1 61 COLLECT 9 EXTRA=AM TOLEDO OHIO 1231P MAR 22 1937

PLASKON CO INC=

=GRASSELLI N.J=

*AVERAGE FREIGHT CHARGES PER OLD MODEL SCALE SHIPPED FROM HERE DURING NINETEEN THIRTY SIX WERE THREE DOLLARS NINE CENTS STOP AVERAGE CHARGES ON PLASKON SCALE ONE DOLLAR THIRTY ONE CENTS STOP ALTHOUGH ONLY ONE MODEL IN EXTENSIVE LINE PLASKON SCALE HAS EFFECTED REDUCTION IN ENTIRE FREIGHT BILL OF APPROXIMATELY EIGHTEEN THOUSAND DOLLARS FOR LAST YEAR.

=L H BAUGHMAN TRAFFIC MANAGER TOLEDO SCALE CO TOLEDO OHIO=

$18,000 SAVED:

Not in theory, but in fact.

In the summer of 1935, the Toledo Scale Company brought out the now famous Duplex scale with Plaskon housing. The year 1936 was the first full calendar year of marketing this scale. Out of that year's experience come startling figures.

So much lighter is the Plaskon scale that it is shipped to its destination for an average charge of $1.31. This is $1.78 less, for each Plaskon scale, than for each equivalent older model. Saving $1.78 per shipment—well, that has its practical points, doesn't it?

Mind you, the Plaskon model is only one model in an extensive line. Yet that one model brought about a saving of $18,000 in the Company's total freight bill.

"This remarkable saving," says the Scale Company, "helped to offset the generally rising costs in taxes, materials, and other items."

LIGHT SHADE:

Plaskon's steady advance in the lighting fixture field is a matter of comment in the industry. Reasons: it makes a superb material for fixtures, insofar as illumination and beauty in decoration are concerned; manufacturers have used its lightness virtually to halve packing, shipping, and breakage costs; its shatter-proof qualities eliminate the need for separate packages for fixtures and light bowls.

The light reflector bowl in the famed student lamp approved by the Illuminating Engineering Society is one well known application of Plaskon in this field.

Another popular application is the lamp shade of exclusive design made for LaSalle Lighting Products, Inc., which is used on every LaSalle wall lamp for lower surface brilliancy with no loss in lighting efficiency.

PLASKON COMPANY

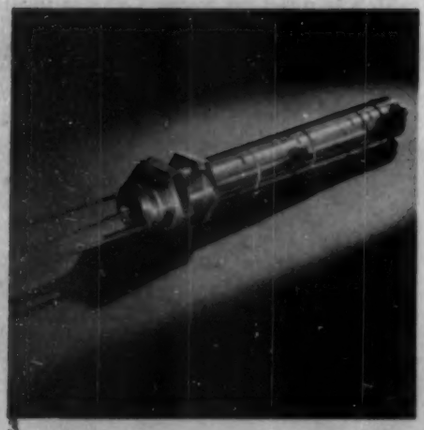
INCORPORATED

1

2

1. An inkwell which is always filled has a plastic cover to conceal the ink bottle. Base is covered with Pyralin and a slanted opening holds the fountain pen in position, protecting its point from rust or breakage.

2. Coty's manicure preparations enjoy a smart setting of molded Beetle. These packages afford maximum display with little danger of breakage to contents. Molded by Colt's Patent Fire Arms Mfg. Company



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3. Gasoline tank gauge with a transparent Pyralin tube manufactured by the Voges Mfg. Company. A small piece of cork rises with the liquid level and brings up a cast resin marker to indicate the contents of the tank

4

5

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4. These radio parts for tuning radio frequency in intermediary frequency circuits in modern radio sets are molded of Textolite by the General Electric Company for the Sprague Specialties Company

5. A light weight sturdy eye-cup with a sanitary dust cover is molded of Durez and Plaskon by Colt's Patent Fire Arms Mfg. Company. If accidentally dropped it escapes damage and leaves no sharp edges to scratch the skin

6. R. L. Arnold Pen Company makes these pencils of Pyralin with nickel trimming. The pencils are warm to touch, easy to clean, and various color contrasts are available

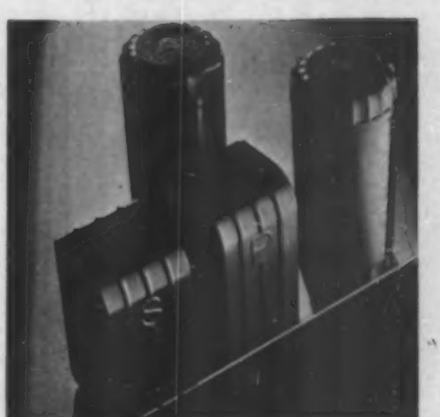
7. The Waltham Watch Box is molded of Plaskon by the Boonton Molding Company and was designed by Eugene Lux. Molded color for packaging has been the jeweler's preference this year because it retains its color under sunlight and powerful display lights

8. The Mennen Company has improved the appearance of its brushless shave, antiseptic oil, and skin bracer by adopting colored Plaskon closures. Caps and containers are produced by the Owens-Illinois Glass Company

9. Translucent Lamicoid (Bakelite laminated) is the material employed by Art-In-Trend for a modern table lamp shade. It is non-inflammable, non-shatterable and unaffected by moisture permitting it to be easily cleaned with a damp cloth

10

10. A molded Beetle cotton dispenser, sanitary and attractive, is made by the Ackerman Rubber and Plastic Molding Company. A cover keeps the cotton clean and a spring metal disc permits easy re-filling



11

11. Giant-size salt and pepper shakers, molded of shatterproof Durez are a genuine kitchen convenience. They resist the action of cleaning compounds, fruit acids, splashing of cooking fats, and are several times lighter than glass

12

12. Kol-Rol is made by the Imperial Brass Mfg. Company of chromium-plated brass. The smoothly rotating handles of Bakelite molded assure a firm grip. Kol-Rol is designed for iced rolling, the opening at either end permits easy loading with either ice water or ice cubes

PLASTIC WINNERS IN THE ALL-AMERICA PACKAGE COMPETITION

Top—Gold Award: Dédon Hostess Package, molded by Colt's Patent Fire Arms Mfg. Co. of Durez and Plaskon for the Dédon Laboratories. A three jar travel kit permitting the packaging of two creams and a powder. Center—Silver Award: Fruit Cake Box molded by Mack Molding Co. of Durez and Beetle for the Larsen Baking Company. A gift package which may serve as a tray or a permanent cake box. Bottom—Bronze Award: Deluxe Carving Set molded by T. F. Butterfield, Inc., of Bakelite and Beetle for Remington Arms Co., Cutlery Division. A box which has splendid display value in a show case and makes a delightful and permanent container in the home

MERCHANDISE DISPLAY

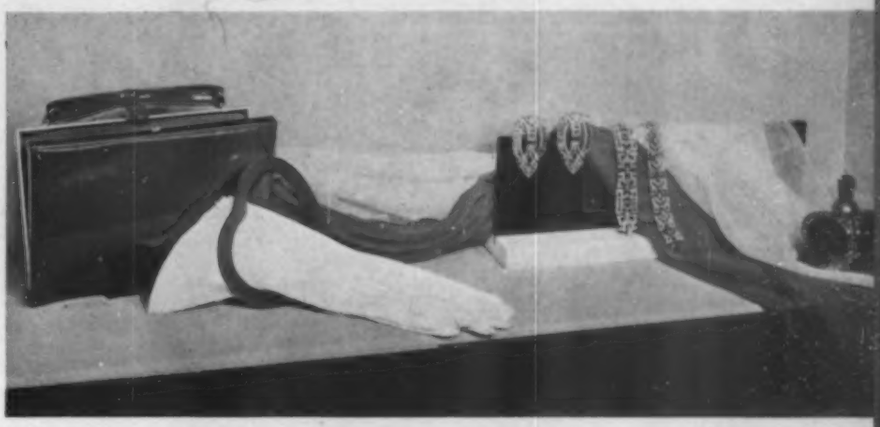
by LAURENCE LONDON
Kaufmann Department Stores

MODERN DISPLAY IN DEPARTMENT store windows and interiors is symbolic of the modern trend in every-day life. During the past fifteen years, the transition to modern design has found champions, both good and bad, among architects and designers and its survival in intelligent use proves that Modernism is neither a passing vogue nor sentimental style. It is a basic idea designating that everything that fits our requirements for form and beauty is modern. Everything is fabricated for a purpose and the only excuse for its being is that it should fulfill the purpose for which it exists.

This idea has found acceptance by the foremost department stores of the country and at Kaufmann's, Pittsburgh, under the guidance of art director Laszlo Gabor, Viennese designer and architect, it has been successfully combined with functional displays.

Functional displays from the viewpoint of the advertising executive are those which produce a greater volume of sales from a given appropriation. Almost invariably, the most attractive and suggestive display is the most appropriate and simple, technically; therefore the most modern. At Kaufmann's, the two finely organized units of Window and Interior Display strive to maintain this modern movement toward simplicity. In the windows, where fashion is the keynote, merchandise is displayed with dramatic and psychological effect for instantaneous attraction and appeal.

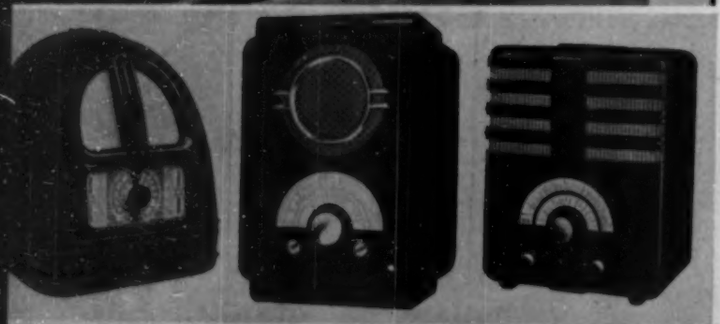
A display may be likened to a stage play from which action is temporarily suspended. Actors resolve themselves into manikins; background, fixtures and accessories become the setting; the ticket of admission is an invitation to look. Three major points must be considered in a successful display. There should be one general idea to which everything should conform; the execution must be flawless and beyond criticism; and last but most important of all, the display must make the public enter the store to inquire about the merchandise dis- (*Continued on page 69*)

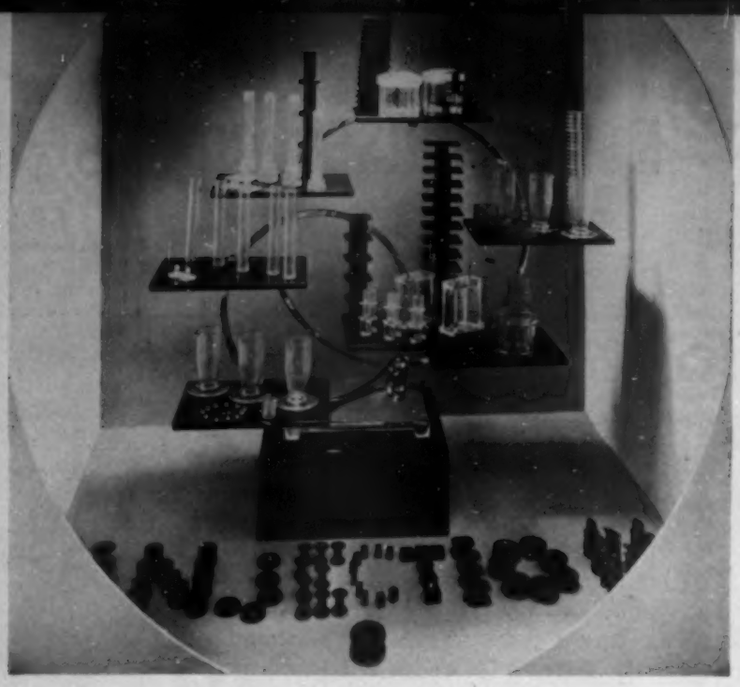


Permanent and seasonal display fixtures are made of plastics

The material can be sawn and bent into attractive shapes

Catalin bands with tiny lights against Micarta columns create this Christmas decoration at Kaufmann's, Pittsburgh





BRITISH INDUSTRIES FAIR

MOLDERS AND MANUFACTURERS ENGAGED IN the plastics industry in England displayed their wares at British Industries Fair held simultaneously at London and Birmingham, Feb. 15 to 26. Limited space prevents more than a brief review and but a few of the many photographs so kindly sent us by G. Norman Higgs, Industrial Consultant, London.

The exhibits showed extensive progress and many remarkable moldings were displayed. British Celanese Ltd. exhibited in the Fancy Goods Section devoting its displays to *Celestoid*, cellulose acetate sheeting and tubing; *Clarifoil*, cellulose acetate paper and foil; and to *Cinemoid*, a non-inflammable plastic sheeting which has passed the stringent specifications of the cinema and theater licensing authorities.

E. K. Cole Ltd., among other things, displayed plastic table tops supported by chromium legs, and a wide range of radio cabinets—three of which are pictured at the left. That at the extreme left is the new Philco, called The People's Model.

De La Rue and Co. Ltd. exhibited business machines including several innovations for beauty shop use. The injection moldings of polystyrol and acetate (above) were displayed by this firm. Bakelite Ltd. (lower left) displayed interesting applications of Bakelite materials.

T. H. & J. Daniels Ltd. displayed preforming machines, downstroke prefilling hydraulic presses and a small preheating oven of their manufacture. We regret we were unable to include the photograph they sent.

TECHNICAL SECTION

MODERN PLASTICS

CHANGING A MOLDER AT THE FOREST PRODUCTS LABORATORY—SEE STORY PAGE 89

NO. 1020

Durite Special Data Sheets No. 1020 give detailed information about Durite Liquid Resin as a heat-set Plywood Bond and Impregnant for lumber and other porous bodies.

Durite as a Plywood Bond has high bonding strength, is heat and weather resisting, economical. It is antiseptic, proof against decay, fungus, bacterial growth. As an impregnant Durite provides harder, stronger, more weather-resistant products.

A request on your business stationery will bring you Durite Special Data Sheets No. 1020.

DURITE *Plastics*

TRADE MARK REG.

Frankford Station P. O., Philadelphia, Pa.

A DIVISION OF STOKES & SMITH COMPANY

Durite Plastics, the exclusive producers of phenol-furfural resins, manufacture many resins for molded parts, a few of which are shown below. Investigate and specify Durite.

Durite Impregnated Handle

LIGNIN AND LIGNIN PLASTICS (A REVIEW)

by GORDON M. KLINE
National Bureau of Standards

When the waste product from one mill becomes the raw material for another, economies that excite industry are indicated in measurable terms. The current interest in lignin plastics prompts this review which, because of its detailed length, must be published in two chapters. The second will appear in our May issue

THE UTILIZATION OF WASTE WOOD AND SAWdust for the production of molding compositions has been the objective of a considerable number of investigators in recent years. The paper (1) presented at the Pittsburgh meeting of the American Chemical Society, which described experiments at the Forest Products Laboratory on the preparation of plastic products from sawdust, has aroused fresh interest in this subject. The supply of sawdust suitable for this purpose runs into millions of tons, much of it now being wasted or used for fuel or other minor applications.

Wood consists principally of cellulose and hemicelluloses (pentosans, hexosans, etc.), both of which are polysaccharides, and lignin which represents the noncarbohydrate portion of the plant, exclusive of small amounts of such constituents as ash, resins, gums, tannins and proteins. The average percentages of the major constituents in various American woods are shown in Table 1, prepared from data compiled by Schorger (2). It will be noted that approximately 25 percent of wood is lignin, an organic material which is present in the cell walls. It is this lignin which is the potential plastic-producing substance in wood. In the past, however, interest in its chemical nature has centered largely around the desire to remove it in the preparation of paper pulp (3). Reagents such as caustic soda, sulphurous acid and chlorine, react with the lignin, dissolve it and free the cellulose. The waste ligneous liquor from the sulphite pulping process is used to some extent for road binders and in the manufacture of linoleum and adhesives, but for the most part the lignin material has been discarded as a waste product.

Aspen and birch stand on the Superior National Forest

Sawdust, waste product of one mill, becomes raw material for another

Table 1. - Composition of American woods (Results based on samples dried at 105° C).

Species	Cellulose (free from pentosans)	Hemicellulose	Lignin
	%	%	%
Western yellow pine	52.36	8.97	26.65
Yellow cedar	48.97	11.29	31.32
Incense cedar	37.41	12.00	37.68
Redwood (heartwood)	43.85	10.55	34.21
Western white pine	55.36	10.19	26.44
Tanbark oak	44.79	19.59	24.85
Mesquite	37.04	14.66	30.47
Balsa	42.59	18.51	26.50
Hickory (shellbark)	43.12	19.62	23.44
Eucalyptus	44.13	22.42	25.07

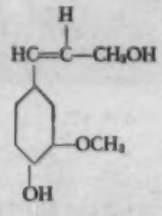
Constitution of lignin

The structure of lignin is still undetermined. Schulze (4), who first gave to the incrusting matter of wood the name lignin, assigned to it the formula $C_{39}H_{54}O_{20}$. This has been revised upward and downward by many authors since that time. It is now known that the elementary composition of lignin varies with the species of wood and even the age or the portion of the tree from which it is obtained, and with the method employed for its isolation. The experimental evidence indicates

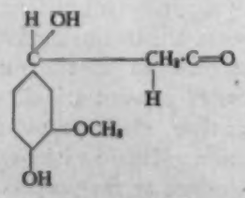
The Forest Products Laboratory at Madison, Wisconsin

that lignin either contains an aromatic nucleus or is readily converted into one. It has also been established that lignin contains methoxyl and hydroxyl groups; according to Phillips (5), proof of the presence of acetyl, carbonyl and ethylenic groups is lacking. The hydroxyl groups appear to be of both phenolic and alcoholic types. Schorger assumes that a lignin, containing approximately 45 carbon atoms, has 8 to 10 hydroxyl groups of which 3 to 5 are combined as methyl ethers and most of the remainder are acetylated. All investigators agree, however, that lignin is very reactive and it is doubtful whether it can be separated from wood in its original condition. Many support the view that the lignin is chemically combined with the cellulose, either in the form of an ester-type union between an acidic group in the lignin and a hydroxyl of the carbohydrate, or an ether-type linkage between the lignin and the cellulose or other carbohydrates.

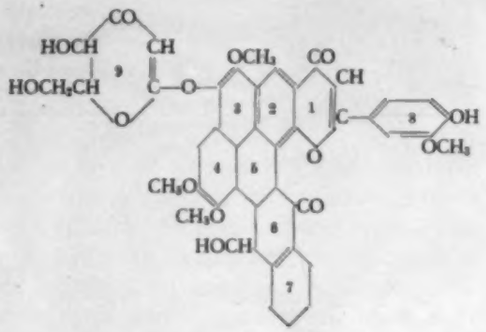
Some examples of proposed structural formulas or units involved in the forming of the lignin molecule will indicate the complexity of the problem of solving its constitution. According to the original conception of Klason (6), lignin is a condensation product of coniferyl alcohol.



In a later publication (6A) he modified his theoretical picture in favor of the view that lignin contains the grouping

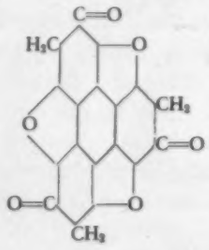


Whether lignin contains a grouping related to coniferyl aldehyde has not been definitely established; the substances obtained on distillation of lignin dry or with zinc dust tend to support this hypothesis. Fuchs (7, 8) has proposed a formula of a hypothetical substance to which all chemical experience in the investigation of spruce lignin may be traced and which may serve as a guide to further experimental work on the structure of lignin.



The empirical formula is $C_{43}H_{42}O_{14}$, the molecular weight 782, the ultimate composition 66.0 percent of carbon, 5.3 percent of hydrogen, and 28.7 percent of oxygen. The compound contains 15.9 percent methoxyl. The oxygen functions comprise 4 methoxyl groups, 1 additional ether linkage, 4 hydroxyl groups (one of them being of phenolic type), 2 oxygen bridges, and 3 cyclic keto groups. The average composition of spruce lignin is consistent with these properties. Furthermore, Fuchs (9) observed that lignin, whether in the wood or isolated, reacts on treatment with diazomethane like a phenol with one hydroxyl group in a molecule having a molecular weight of 800.

Another interesting hypothesis on the constitution of lignin is that of Schrauth (10). He suggests that the fundamental unit of the lignin molecule is



which is formed by the condensation of three molecules of 5-hydroxymethylfurfural which is itself produced by the internal condensation of hexoses. Units so formed consist of a compact condensed ring system, of which three of the outer rings are furane nuclei and the other three outer rings and the central ring are benzene nuclei.

Hilpert (11) has even questioned the existence of lignin in plant life and indicates that its origin should be looked for in the interaction of the carbohydrate material and the chemicals used to isolate lignin. Hawley and Harris (12) have, in fact, prepared so-called "synthetic lignin." They heated cellulose obtained from white spruce and sugar maple by the method of Cross and Bevan and, therefore, containing hemicelluloses, for 8 days at 135° C in an autoclave. Some of their results are shown in table 2.

The similarity of this synthetic product to natural lignins is shown by (a) its resistance of hydrolysis with 72-percent sulphuric acid, (b) solubility in sulphite reagent after chlorination, (c) ultraviolet absorption spectrum, and (d) reducing value. The authors suggest the hypothesis that the differences between hardwood and softwood lignins are related to the preponderance of pentosan and hexosan units, respectively, that enter into their formation. However, whatever may be the mechanism of the formation of lignin, practically all of the experimental evidence indicates its existence in the plant itself (8, 13, 14).

Reactivity and isolation of lignin

Lignin readily undergoes a variety of reactions, including acylation, alkylation, halogenation, nitration, sulphonation, oxidation, reduction, and hydrolysis. The various methods described in the literature for the isolation of lignin may be conveniently divided into two classes. Those of one class depend on the removal, by hydrolysis, of the cellulose and other components, leaving the lignin as an insoluble residue. These processes involve the use of approximately 72 percent sulphuric acid or of fuming hydrochloric acid. Those of the other class depend on the removal, by solution, of lignin from the cellulose and other substances with which it is associated. The methods of this second class are those of industrial importance in pulp manufacture and include the sulphite process (a mixture of sulphurous acid and acid sulphite) and the alkali method (aqueous or alcoholic sodium hydroxide). Halogenation can also be used, the oxidized and substituted product being readily soluble in alkalis.

Preparation of plastics from lignin

In the preparation of molding compounds from natural products containing lignins it is not necessary to separate the lignin from the cellulose and other constituents which may be present. Thus, E. Bateman (1) and his associates found that several different types of chemical treatment of sawdust, for example, hydrolysis, chlorination, and esterification, would convert it into a powder which could be molded into sheets without further treatment if the temperature and pressure used were high enough. However, they found it preferable to add aniline and furfural to the hydrolyzed sawdust in approximately equal proportions, about 6 to 8 percent of each giving the best results. The properties of such wood plastics are shown in table 3, according to information supplied by the Forest Products Laboratory, Madison, Wisconsin. These figures were obtained on plastics prepared in the following manner. Maple sawdust was hydrolyzed by 1 percent sulphuric acid. The residue after hydrolysis was washed with water to free it from sugar and acid. It was then ground, mixed with 8 percent of furfural, 8 percent of aniline, and 2 percent of barium hydroxide, and pressed at 135° C for 10 minutes at 3000 pounds per square inch.

The various reagents that have been used to react with lignin to form a plastic material may be classified under three general headings, namely, (a) phenols, (b) amines and (c) aldehydes. Many references to studies in this field are cited by Carleton Ellis (15) in his discussion of "Resins from Wood." A few examples of the reaction of these three types of chemicals with lignin will be considered in this article.

References

(1) E. Bateman, E. Berlinger, J. P. Hohf, E. C. Sherrard, and H. D. Tyner, Pittsburgh meeting, American Chemical Society, Sept. 10, 1936. See abstract in Modern Plastics **14**, 68 (Nov., 1936).

(2) A. W. Schorger, The Chemistry of Cellulose and Wood, McGraw-Hill Book Co., New York, 1926.

(3) E. C. Sherrard, Proc. 5th Pacific Congr. 1933, Vol. I, pages 543–5.

(4) F. Schulze, Chem. Centr. **28**, 321–5 (1857).

(5) M. Phillips, Chem. Rev. **14**, 103–70 (1934).

(6) P. Klason, Arkiv Kemi, Mineral. Geol. **3**, No. 5, 17 (1908).

(6A) P. Klason, Ber. Deut. Chem. Ges. **64**, 2733 (1931); **65**, 625 (1932).

(7) W. Fuchs, J. Am. Chem. Soc. **58**, 673–80 (1936).

(8) W. Fuchs, Paper Trade J. **102**, TS181–4 (Mar. 26, 1935).

(9) W. Fuchs and O. Horn, Ber. Deut. Chem. Ges. **62**, 1691 (1929).

(10) W. Schrauth, Z. angew. Chem. **36**, 149 (1923).

(11) R. S. Hilpert and E. Littmann, Ber. Deut. Chem. Ges. **68**, 16–18 (1935).

(12) L. F. Hawley and E. E. Harris, Ind. Eng. Chem. **24**, 873–5 (1932).

(13) S. A. Waksman and T. C. Cordon, J. Am. Chem. Soc. **58**, 969–72 (1936).

(14) F. E. Brauns, Paper Trade J. **103**, 41 (Sept. 10, 1936); E. Heuser, Paper Trade J. **88**, 75 (May 23, 1929).

(15) C. Ellis, Chemistry of Synthetic Resins, Reinhold Publishing Corp., New York, 1935.

These reactions will be detailed in the May issue of Modern Plastics

Table 2.- Change in apparent lignin content of wood cellulose heated for 8 days at 135° C.

	White-Spruce (soft)		Sugar-Maple (hard)	
	Before heating	After heating	Before heating	After heating
	%	%	%	%
Cross and Bevan cellulose	(100)	8.0	(100)	86.4
Pentosan	9.3	0.0	20.5	6.0
Lignin	0.3	70.3	0.3	6.9

Table 3. - Properties of lignin plastics

Density	1.39 - 1.41
Modulus of rupture	$14{,}000 \times 10^{-0.094N}$ lbs/sq. in. where N is percentage of moisture content
Electrical resistance	5×10^{11} ohms/sq cm at 30% relative humidity 2.5×10^{9} ohms/sq cm at 90% " "
Machinability	Like hard rubber

Behavior on exposure to water or moisture

Exposure condition	Percentage increase in weight after		
	1 day	10 days	100 days
Water	1.0 - 2.0	4.5 - 7.0	6.0 - 10.0
90% relative humidity	0.5- 1.0	2.5 - 4.0	4.5 - 6.0
65% " "	0.2 - 0.4	1.0 - 1.3	2.0 - 2.7
	Percentage increase in length and breadth after		
	1 day	10 days	100 days
Water	0.2- 0.3	0.7 - 1.0	1.2 - 1.4
90% relative humidity	0.1- 0.2	0.4 - 0.6	0.7 - 0.8
65% " "	0.1 - 0.2	0.3 - 0.4	0.5 - 0.6
	Percentage increase in thickness after		
	1 day	10 days	100 days
Water	0.9 - 2.0	3.0 - 5.0	8.0 - 11.0
90% relative humidity	0.4- 0.8	1.5 - 2.0	3.0 - 4.0
65% " "	0.1 - 0.5	0.5 - 1.5	1.4 - 2.0

SHRINKING AND SWELLING OF WOOD REDUCED BY SYNTHESIZING RESINS WITHIN THE WOOD

by ALFRED J. STAMM
Senior Chemist Forest Laboratory,[1] Forest Service, U. S. Department of Agriculture

ALTHOUGH WOOD IS REMARKABLE AMONG natural organic materials in exhibiting a minimum shrinkage and swelling, as manifested by the changes of the external dimensions, these dimensional changes are sufficiently great to introduce considerable difficulties and even limitations in its use. The hollow fibrous structure of wood is so constituted that the fiber cavities change dimensions but very slightly when the wood shrinks and swells. If the cell walls of the wood were made up of a microscopically structureless material such as a gelatin gel, the fiber cavities would decrease in size on shrinking and increase in size on swelling so as to give external dimensional changes two to four times as great as actually occur. Nature has thus already minimized the shrinking and swelling of wood to a large extent, thus making further dimunition of dimensional changes extremely difficult.

Most of the efforts of the Forest Products Laboratory to minimize the shrinking and swelling of wood have been extended in developing surface coatings that are as impermeable as possible to water, thus mechanically blocking the coming and going of moisture which is directly responsible for the dimensional changes. Considerable success has been met with in this direction. Coatings have been developed that show moisture-excluding efficiencies as high as 98 percent as compared to unprotected controls when alternately exposed to relative humidities of 95 to 100 percent for two weeks, 60 percent relative humidity for two weeks, and weather exposure for six weeks for periods of more than a year. These coatings consist of aluminum leaf between coats of other materials, such as paints or varnishes. Coatings of varnish, enamel, or paint containing aluminum powder give moisture-excluding efficiencies of 90 percent and better under similar exposures, and bituminous paints, granular pigment paints, and spar varnish, as well as synthetic resin varnishes, all show moisture-excluding efficiencies between 50 and 90 percent when a number of coats are applied.

In order to get the foregoing protection, all surfaces of the wood must be completely enveloped with the coating. A break at any point will appreciably decrease the efficiency. In construction work the application of complete coatings on all surfaces after assembly is almost impossible. The use of precoated material of the required dimensions would appear to be the solution of the problem but even here the envelope is broken to some extent on nailing. Surface coatings further give only temporary protection where the material is subject to abrasion, as in the case of floors and window casings. Then, too, the exposure of the coated wood to prolonged low and high relative humidities, such as in northern climates where the houses are heated for practically half of the year, cuts down the moisture-excluding efficiency. Any protection which merely cuts down the rate of absorption of moisture naturally will show up to best advantage when the atmospheric moisture conditions are changing more rapidly than the material can take up or give off moisture.

Although surface coatings are of extreme value, it is obvious that they do not offer an entire solution of the problem. For this reason a treatment of the wood was sought that would actually cut down the affinity of wood for water and thus permanently reduce the moisture absorption and make possible the cutting, nailing and abrasion of the wood without loss of moisture-excluding efficiency. Preliminary studies showed that depositing of waxes and resins in the same structure within the cell wall where the moisture is absorbed with accompanying swelling materially reduces the original shrinkage but does not prevent moisture from ultimately being absorbed and swelling occurring beyond the original green dimensions of the wood. Even though the waxes and resins in themselves are highly water-resistant, water works its way between the internal wax films and wood. Although the treatment appreciably reduces the rate of take-up of water, the amount finally taken up is not affected. It was obvious that a treating material would have to be used that would actually bond to the wood. Materials that have an affinity for wood, unfortunately, also have an affinity for water so that they would be of no value in excluding moisture. It thus is necessary in using such a wood-bonding material to convert it to a water-insoluble material after it has bonded to the wood. This is exactly what is done in the process of forming synthetic resins within the wood structure, which was recently developed by the Forest Products Laboratory.

The wood is treated with a mixture of phenol and formaldehyde, together with a catalyst dissolved either in water or wood alcohol. In case the wood is green the treatment consists in soaking the wood in the solution at room temperature sufficiently long for the solution to diffuse into the entire fine structure of the wood, or, in the case of air-dried wood (4 to 15 percent moisture), the diffusion part of the treatment can be advantageously preceded by an (*Continued on page 71*)

[1] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

Stock molds

SHEET THIRTY-ONE

These boxes in a variety of shapes and sizes, are available from stock molds. They were created for cosmetic containers and packaging, and have good reuse value. Samples will be sent to executives who write on company letterheads specifying both sheet and item numbers

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93. Octagonal box with telescope cover designed with a trademark which can be deleted. 2 3/16 in. diameter by 2 in. deep inside. 3 9/16 in. overall height

94. Round box with telescope cover. 2 11/16 in. diameter by 1 1/4 in. deep. 1 9/16 in. high overall

95. Octagonal box with telescope cover, groove design. 2 3/4 in. diameter. 7/8 in. deep. 1 3/16 in. overall height

96. Round box with telescope cover and groove decoration. 2 1/8 in. diameter. 1 1/16 in. depth. 1 5/16 in. height overall

97. The smallest of a series of octagonal boxes of identical design in varying sizes, each with round screw closures. Diameter is 1 1/8 in. Depth 15/16 in. Overall 1 5/16 inches

98. Diameter 1 9/16 in. Depth 1 3/16 in. Overall 1 5/8 inches

99. Diameter 1 3/4 in. Depth 1 5/8 in. Overall 2 1/16 inches

100. Diameter 1 15/16 in. Depth inside 1 13/16 in. Overall height 2 1/4 inches

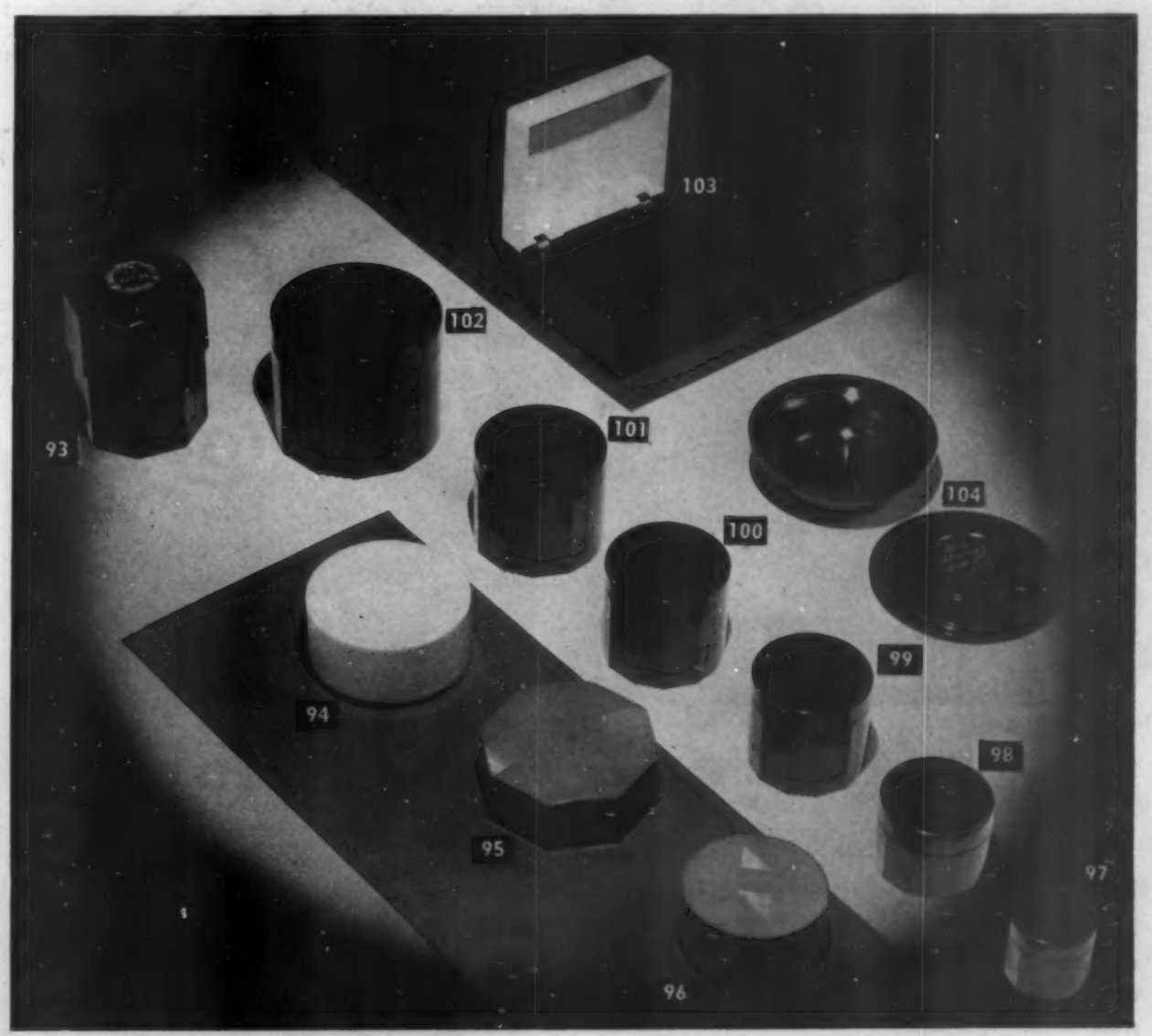
101. Diameter 2 3/16 in. Depth 2 in. Overall 2 1/2 inches

102. Diameter 2 7/8 in. Depth 2 9/16 in. Overall 3 inches

103. Oblong box with hinged cover. Length 3 11/16 in. Width 3 1/16 in. Depth 1 3/8 in. Overall height is 2 5/16 inches

104. Stag Shaving Bowl is engraved in the cover of this round box which has 3 1/2 in. diameter and a depth of 1 1/4 in. Overall height 1 3/4 inches

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.



436. Pot handle with comfortable finger grips and ribbed decoration, 5 5/8 in. long and 7/8 in. wide. An extension 5/8 in. long with opening 1/4 in. in diameter makes attachment easy

437. Same as 436, 5 1/8 in. long

438. Bail handle 5 7/8 in. long, slightly curved with finger grips

439. Coffee pot handle, height 4 1/2 in., width at top, 2 1/4 in. with two openings for attachment

440. Handle with ribbed design and comfortable finger grips 4 in. long and 7/8 in. wide

441. Handle 4 3/4 in. long with two threaded fittings for attachment molded in

457. Memo tray molded in one piece and name plate applied with rivets. 5 3/8 in. long, 5 1/8 in. wide and 1 1/8 in. deep. The tray will accommodate memo slips 5 1/8 in. by 3 1/8 in. The two openings at the top are for erasers, paper clips, etc.

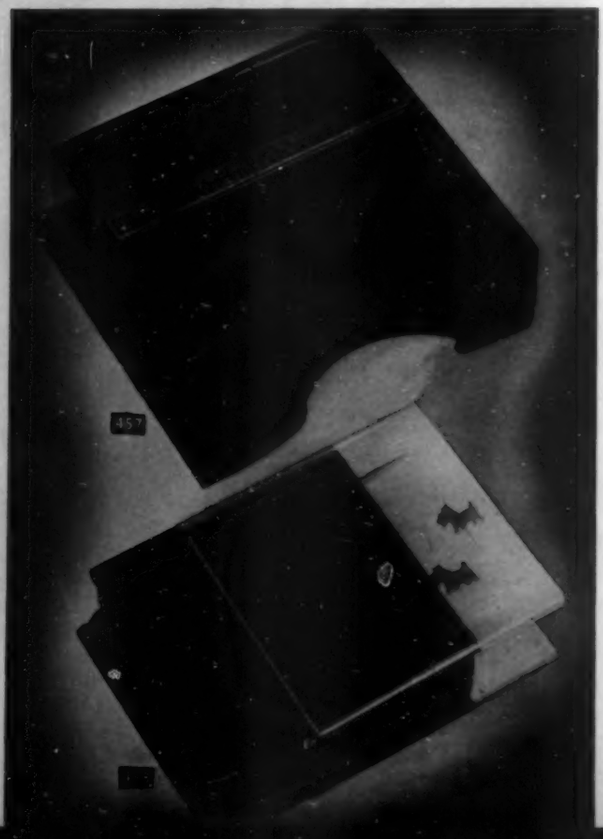
458. Box 3 5/8 in. square and 5/8 in. deep. A slide cover of sheet acetate and a little novelty dog cemented on, provide a very interesting packaging item

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

Stock molds

SHEET THIRTY-TWO

Handles of plastics are good insulation from heat or cold and are becoming increasingly popular for household utensils. Those illustrated above may be had from stock molds. Two good premium items appear at the right



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ECONOMIC AND ENGINEERING TRENDS IN PLASTICS

by A. F. RANDOLPH

(Abstracted from Chemical and Metallurgical Engineering, 44, 25–8, 1937

BEFORE THE DAYS OF SYNTHETIC RESINS THE principal molding material was shellac, which had the disadvantage of low softening temperature. It now appears that through suitable compounding with chemical agents shellac can be made to cure in the molds in somewhat the manner of the recognized heat-setting resins, and rapidly enough to permit of molding at an economically short cycle. Recent years have brought advances in the quality of the nitrocellulose used for plastics. Purification of water supplies, improvement in the mechanical features of nitration to promote uniformity, pH control throughout the stabilization and purification of the nitrocellulose and the use of alloy steels in nitrating and mixing equipment have all contributed to the marked improvement. Probably the most noteworthy advance in the plastics industry in recent years has been the development of methods of manufacturing safety glass interlayer in continuous sheeting by processes of extrusion, resulting in a product which is clearer, cleaner and more economically cut to size. Noteworthy in the expansion of the fields of application of plastics has been the injection molding of small parts of delicate or complicated shape and the successful molding, by compression, of articles of size recently considered beyond the scope of the technique, such as cabinets and housings for radios, office machines and merchandise scales. Unfilled transparent cellulose acetate sheeting, containing a suitable but limited percentage of plasticizer, has been found ideal for the manufacture of high quality sound records, such as are demanded for electrical transcription broadcasts. The demand for economy in molding has stimulated the development of phenol-formaldehyde resins of greater speed of hardening, with corresponding shortening of the molding cycle. Another type, of particularly ready flow and comparatively slow rate of hardening, is designed for injection and transfer molding. A compound of improved resilience has been developed to permit threaded articles to be forcibly removed from the molds, instead of being unscrewed from the molds. Heat-setting resins are made by the reaction of phenol with furfuraldehyde, which furnishes in the single substance a resinifying agent, a hardening agent and a plasticizer. Current urea-formaldehyde resins, available in translucent white and bright tints, show improvements in ease of molding and in strength of the molded article. In the field of vinyl resins, one of the first to go into commercial production was an interpolymer of vinyl acetate and vinyl chloride. More recently developed and now on the market in small quantities are resins derived from polyvinyl acetate by hydrolysis and interaction with aldehydes. As a class these acetal resins are of good appearance and of excellent toughness. Certain individuals have been proposed for general molding use, while others have distinct promise for safety glass interlayer. The polymerized esters of acrylic and methacrylic acids are characterized by their transparency and color possibilities. The low moisture absorption and the fact that no volatile solvent is used in their manufacture insure permanence of dimensions and freedom from warpage. In making resins of the alkyd type, the use of terpene-maleic anhydride has shown interesting results. In the field of cold molded plastics, the trend has been toward the inorganic or refractory type, in which important improvements have been made in reducing water absorption, with benefit to the dielectric properties, and in the adaptability of the material to the molding of more intricate parts.

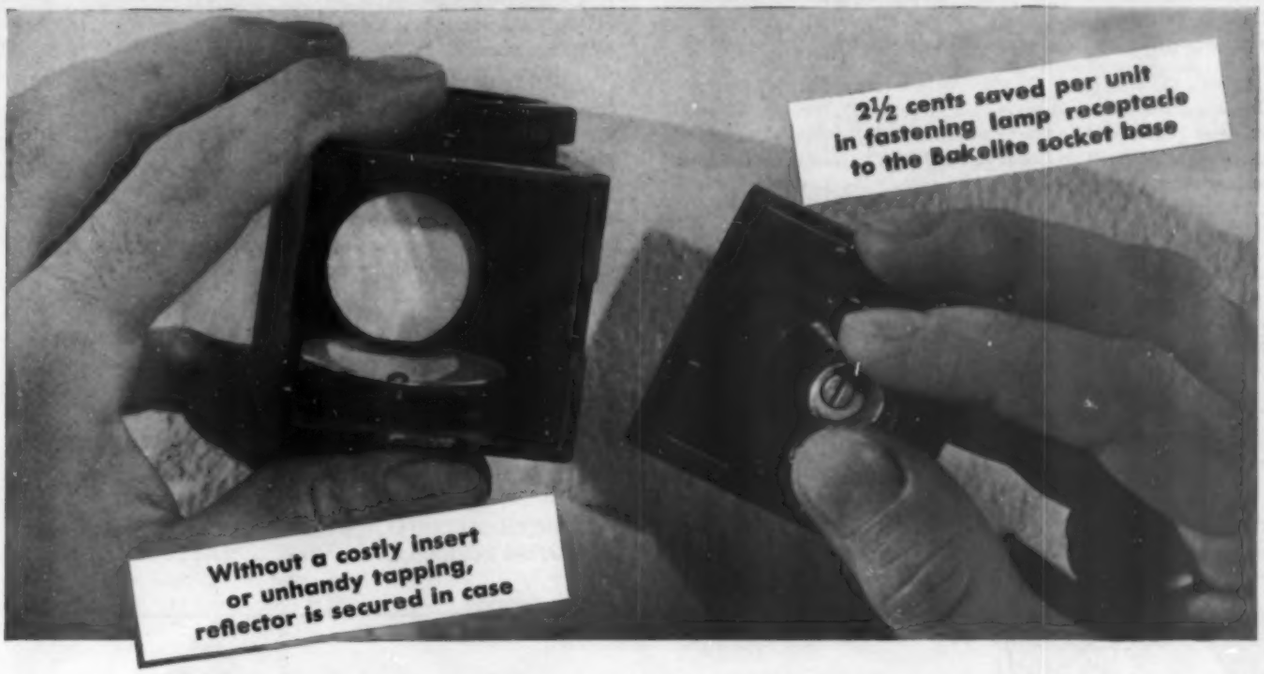
A NEW MATERIAL: ETHYL CELLULOSE

by J. M. DEBELL

(Abstracted from Chemical and Metallurgical Engineering, 44, 31–2, 1937)

ETHYL CELLULOSE, FIRST PROPOSED AS A commercial material by Leuchs and Lilienfeld in 1912, is prepared by treatment of cotton or wood cellulose of carefully controlled viscosity and moisture characteristics with sodium hydroxide in water, by mastication, grinding or steeping and pressing. The resulting alkali cellulose is then subjected to the action of an alkylating agent, usually ethyl chloride, but occasionally ethyl sulphate. The reaction lasts over a period of hours and when complete the excess reactants and by-products are removed by distillation and washing. The ethyl cellulose which has been formed may be purified by simple washing or by solution and reprecipitation. Important factors in the control of ethyl cellulose are the ethoxy content; the viscosity which is ordinarily determined in a 5 percent solution of toluol-alcohol 80:20; ash, including complete metallic analysis if solutions are hazy; and stability of the film to con- *(Continued on page 69)*

TWO SIMPLE FASTENINGS
demonstrate
that it pays to "know" Self-tapping Screws



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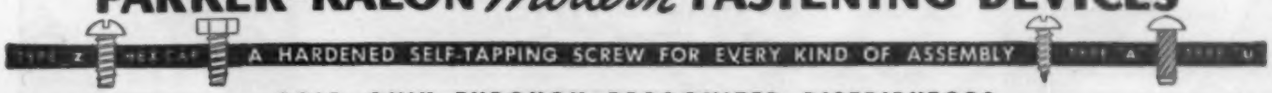

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U. S. plastics patents

Abstracts of Patents from the Official Gazette of the U. S. Patent Office. Correspondence regarding them should be addressed to the Technical Editor, Modern Plastics, 425 Fourth Avenue, New York

MANUFACTURE OF ORGANIC ESTERS OF CELLULOSE. C. Dreyfus and H. E. Martin (to Celanese Corp.). U. S. 2,071,333, Feb. 23. Removal of sulphur compounds without substantial hydrolysis by treatment with water vapor at suitable temperatures.

LAMINATED SAFETY GLASS. W. J. Arner and R. W. Wampler (to Libbey-Owens-Ford Glass Co.). U. S. 2,071,377, Feb. 23. Adhesive for safety glass having an interposed adherent layer of cellulose acetate plastic made by treating cellulose acetate with a mixture of hydrochloric acid and ortho-phosphoric acid, and then dissolving the same in a plasticizer therefor.

TREATMENT OF TEXTILE MATERIAL. W. H Moss (to Celanese Corp.). U. S. 2,071,419, Feb. 23. Producing increased resistance to creasing by impregnating fabric with at most one ounce per square yard of solid polymerization products of unsaturated aliphatic aldehydes and of esters of unsaturated aliphatic acids.

FILM. M. Hagedorn, A. Ossenbrunner and G. Wilmanns (to Agfa Ansco Corp.). U. S. 2,071,462–3, Feb. 23. Casting films from solutions composed of cellulose acetate, methylene chloride, chloroform, an alcohol, and various softening agents.

PREPARATION OF ARTIFICIAL RESIN COMPRESSION MIXTURES. R. Hessen. U. S. 2,071,523–4, Feb. 23. Impregnation of porous solid filling materials with resol resins by subjecting the mixture for a short time to high pressure at a high temperature in the absence of solvents to yield products suitable for molding and for lacquer ingredients.

MOLDING PRESS. A. M. Howald (to Plaskon Co., Inc.). U. S. 2,071,795, Feb. 23. Specifications for a hydraulic press automatically providing low and high pressures.

PIGMENTED COMPOSITION. R. L. Jenkins (to Swann Research, Inc.). U. S. 2,071,836, Feb. 23. Producing translucency in organic plastics by incorporating a highly halogenated diphenyl.

PREPARATION OF POLYMERS IN SHEET OR BLOCK FORM. H. J. Tattersall (to Imperial Chem. Ind. Ltd.). U. S. 2,071,907, Feb. 23. Polymerization of methyl methacrylate while under pressure between two plates.

LAMINATED STRUCTURE. R. F. Dickson (to E. I. du Pont de Nemours and Co.). U. S. 2,071,921, Feb. 23. Method of bonding sheets of seasoned opaque organic plastics and transparent organic plastics.

PROCESS OF POLYMERIZATION. M. L. Macht (to E. I. du Pont de Nemours and Co.). U. S. 2,071,932, Feb. 23. Polymerizing methyl methacrylate under conditions which will permit granulation at 100° C. in a closed mixer provided with a reflux condenser.

RESINOUS PRODUCTS AND PROCESS. C. Ellis (to Ellis-Foster Co.). U. S. 2,072,068, Feb. 23. Reaction product of a polymerized polyhydric alcohol, a crystalline organic carboxylic acid, drying oil acids, and a natural resin.

COMPOSITION OF MATTER FOR COATING INDUSTRY. C. Ellis (to Ellis-Foster Co.). U. S. 2,072,069, Feb. 23. Coating composition comprising chlorinated rubber and a heat-treated mixture of a fatty oil and a xylenol-aldehyde resin soluble in said oil.

RESINOUS MATERIAL. L. A. Mikeska and S. C. Fulton (to Standard Oil Development Co.). U. S. 2,072,120, Mar. 2. Resinous

U. S. plastics patents

material, soluble in hydrocarbon oils, produced by alkylating a resin containing a reactive aromatic group.

PRESS SYSTEM. T. F. Stacy (to French Oil Mill Mach. Co.). U. S. 2,072,141 and 2,072,488, Mar. 2. Specifications for hydraulic presses.

SYNTHETIC RESINS. R. T. Ubben (to E. I. du Pont de Nemours and Co.). U. S. 2,072,142–3, Mar. 2. Hydrogenating catalytically an aldehyde-polynuclear phenol resin at a temperature of 140–225° C. and a pressure of 150–4000 lb/sq. in.

SULPHONATED CONDENSATION PRODUCT. H. A. Bruson and O. Stein (to Rohm and Haas Co.). U. S. 2,072,153, Mar. 2. Water soluble product prepared by sulphonating a condensation product of naphthalene and a polymer of isobutylene.

ARTIFCIAL TEXTILE MATERIAL. W. Whitehead (to Celanese Corp.). U. S. 2,072,231, Mar. 2. The addition of catalytically oxidized oil, such as oxidized olive oil, peanut oil, cotton seed oil and castor oil, to solution of organic derivatives of cellulose.

MANUFACTURE OF CELLULOSE DERIVATIVES. H. Dreyfus. U. S. 2,072,249, Mar. 2. Pretreatment of cellulose with a lower fatty acid and a strong mineral acid, neutralizing at least partially the mineral acid, and admixing with an organic acid anhydride without substantial rise in temperature.

ESTERIFICATION OF CELLULOSE. C. I. Haney (to Celanese Corp.). U. S. 2,072,260–1, Mar. 2. Esterifying cellulose with an organic acid in the presence of less than 10% of a sulphur-containing catalyst together with 2% to 15% of a halogen-containing inorganic acid, said ester requiring no stabilization step.

METHOD OF MAKING ORGANIC ESTERS OF CELLULOSE. H. E. Martin (to Celanese Corp.). U. S. 2,072,270, Mar. 2. In the process of preparing a cellulose ester, adding a neutralizing agent for the catalyst and an organic non-solvent liquid, and distilling to remove the organic acid and non-solvent liquid.

POLYMERIZED VINYL ALCOHOL ARTICLES. W. O. Herrmann, E. Baum, and W. Haehnel (to Chemische Forschungsges.). U. S. 2,072,302–3, Mar. 2. Formed surgical and medical articles which, when sterile, are incapable of causing suppuration and fistular formation, made from esters, ethers and acetals of polyvinyl alcohol, the esters of polyacryl and polyitaconic acid, and polystyrols.

POLYMERIC N-VINYL COMPOUNDS. W. Reppe and E. Dorrer (to I. G. Farbenind. Akt.). U. S. 2,072,465, Mar. 2. Polymerization of N-vinyl pyrrole compounds.

LAMINATED GLASS. E. L. Fix and B. J. Dennison (to Duplate Corp.). U. S. 2,072,583, Mar. 2. Cement for same comprising a solution including water, cellulose derivative similar in composition to the plastic sheet, a solvent for the cellulose derivative, and an alkaline metal salt.

THERMOPLASTIC ADHESIVE. R. M. Freydberg (to Acme Packing Corp.). U. S. 2,072,631, Mar. 2. Composition comprising substantially 100 parts polyvinyl chloride-acetate resin, 10% dibutyl phthalate and 1% chlorinated rubber, retaining adhesive properties below 212° F. and melting at about 300° F.

MANUFACTURE OF PLASTIC MATERIAL. T. Robinson (to Lancaster Processes, Inc.). U. S. 2,072,686–7, Mar. 2. Composition comprising a bituminous binding medium, natural wood fibres and a polyvalent alkaline substance in combination with the lignin derived from said fibres and forming therewith water-insoluble compounds.

U. S. plastics patents

PROCESS OF STABILIZING CELLULOSE XANTHATE. H. B. Dykstra (to E. I. du Pont de Nemours and Co.). U. S. 2,072,738, Mar. 2. Wash with acetone and dehydrate at 40–100° C. in a current of an inert gas capable of taking up moisture.

ESTERS. H. B. Dykstra and W. E. Lawson (to E. I. du Pont de Nemours and Co.). U. S. 2,072,739, Mar. 2. New esters of the formula $R^1—O—CO—R^2—CO—O—R^3—CO—O—R^4$ wherein R^1 and R^4 are different monovalent open chain radicals from the class consisting of open chain hydrocarbon radicals and alkoxysubstituted open chain hydrocarbon radicals, and one is an alkyl radical, R^2 is a divalent aromatic hydrocarbon radical, and R^3 is a divalent aliphatic hydrocarbon radical.

SYNTHETIC RESIN AND METHOD. H. H. Coburn (to Hercules Powder Co.). U. S. 2,072,810, Mar. 2. Reaction product of an alcohol and an acidic composition made by reacting dipentene, maleic anhydride and a compound containing the abietyl radical.

SYNTHETIC RESIN. I. W. Humphrey (to Hercules Powder Co.). U. S. 2,072,818–9, Mar. 2. Synthetic resin made by reacting an alcohol with a product of the reaction of an abietic acid ester and maleic anhydride.

CELLULOSE DERIVATIVES. H. Dreyfus. U. S. 2,072,870, Mar. 9. Nitrogen-containing cellulose derivatives made by reacting an organic base containing one or more replaceable hydrogen atoms attached to nitrogen with a derivative of cellulose containing an unsaturated grouping.

MANUFACTURE OF SYNTHETIC RESINS. W. H. Moss (to Celanese Corp.). U. S. 2,072,901–2, Mar. 9. Resin obtained by the reaction of formaldehyde with the condensation product of a phenol with a halogenated aliphatic ketone.

POLYMERIZATION OF ORGANIC COMPOUNDS. E. D. Ries (to E. I. du Pont de Nemours and Co.). U. S. 2,072,904, Mar. 9. Polymerization of a clear solution of methyl methacrylate, water and a water soluble monohydric aliphatic alcohol.

PROCESS FOR THE MANUFACTURE OF CONDENSATION PRODUCTS FROM NON-ALIPHATIC SULPHAMIDES AND ALDEHYDES. G. Walter. U. S. 2,072,971, Mar. 9. Condensation of an aldehyde with a sulphamide of a cyclic organic compound containing besides at least one substituted or unsubstituted sulphamyl group (SO_2NH_2) a group containing a substituted or unsubstituted NH_2 radical or a substituted or unsubstituted NH_2 group itself, at least one of the sulphamyl or NH_2 groups being unsubstituted.

CELLULOSE ETHER RECOVERY. W. R. Collins and W. J. Le Fevre (to Dow Chemical Co.). U. S. 2,073,002, Mar. 9. Precipitation of alkyl cellulose ether by discharge of reaction product into boiling water.

FIREPROOF MATERIAL. R. Engelhardt (to I. G. Farbenind. Akt.). U. S. 2,073,004, Mar. 9. Impregnation of organic fibrous material with a mixture of about 70 to 95 parts of chlorinated naphthalenes or diphenyls and about 30 to 5 parts of chlorinated rubber or polyvinylchloride.

MANUFACTURE OF CELLULOSE DERIVATIVES. H. Dreyfus. U. S. 2,073,052, Mar. 9. Process of reacting with ammonia under anhydrous conditions a cellulose ester of an acid containing an unsaturated aliphatic radical with substantially no saponification.

WATERPROOFING COMPOSITION. C. J. Malm and C. R. Fordyce (to Eastman Kodak Co.). U. S. 2,073,310, Mar. 9. A coating composition adapted for the manufacture of a highly moisture-resistant, non-blushing sheet or film having approximately the following com-

U. S. plastics patents

position: Cellulose acetate stearate (containing about 38% stearyl) 100 parts by weight, glycerol tristearate 3, ester gum 10 and normal butyl acetate 400.

PROCESS OF PRODUCING TRANSFORMATION PRODUCTS OF ACRYLIC ACID OR ITS DERIVATIVES. W. Bauer and A. Gerlach (to Röhm and Haas Co.). U. S. 2,073,619, Mar. 16. Polymerizing an ester of acrylic acid in the presence of a substance which will split off oxygen in the reaction.

CELLULOSE DERIVATIVE PRODUCTS. H. Dreyfus. U. S. 2,073,687, Mar. 16. Cellulose esters of lower fatty acids only mixed with a relatively small proportion of cellulose esters of higher fatty acids only.

CELLULOSE ESTERS AND PRODUCTION OF SAME. F. Schulze (to E. I. du Pont de Nemours and Co.). U. S. 2,073,853, Mar. 16. Washing cellulose acetate with water having an A.P.H.A. turbidity of below 0.9 to yield haze-free products.

SOLVENT AND PLASTICIZING COMPOSITION. L. P. Kyrides (to Monsanto Chem. Co.). U. S. 2,073,938, Mar. 16. An organic plastic admixed with a plasticizer which is a neutral ester of a monoalkyl ester of phthalic acid, chlorphthalic acid, succinic acid, adipic acid or diglycollic acid, the other carboxyl group being esterified by an oxy acetic alkyl ester, an oxy propionic alkyl ester or an oxy butyric alkyl ester, the said alkyl groups being saturated.

HIGH MELTING POINT ROSIN AND METHOD FOR ITS PRODUCTION. P. Schnorf (to Hercules Powder Co.). U. S. 2,074,192 Mar. 16. Polymerization of rosin by heating below the decomposition point with a metallic chloride derived from a metal capable of forming an amphoteric hydroxide.

MANUFACTURE OF FLEXIBLE BANDS, THREADS, FOILS AND TUBES OF ARTIFICIAL SUBSTANCES. E. Studt and U. Meyer (to Nord-deutsche Seekabelwerke A. G.). U. S. 2,074,285, Mar. 16. Articles manufactured of polystyrol (or other polymerization products of aryl olefins) rendered highly flexible by simultaneously heating it to a temperature between about 140° to about 155° C. and stretching it.

Plastics patents

Screw caps for perfume bottles and like decorative containers are molded with a knob or projection on the top which is perforated so that a tassel or bow of ribbon can be tied to the cap. This is accomplished by a simple molding expedient; a perforating member (U-shaped) is carried by the die in correct position for forming a passage of the desired size and cross sectional shape transversely through the projection. The arm of the U may be made very slightly shorter than the width of the projection, so that a thin film is left at one end of the perforation to be broken out as required. The same idea can be extended to a variety of molded articles having knobs or projections, for example, flat disk lids or covers having an upright peg or knob for a handle. Two or more holes may be molded in the same projection if required. (P. A. Hopf, Hopf Products, Ltd., 19 Great Prescot St., Whitechapel, London, British Patent 455,561.)

●

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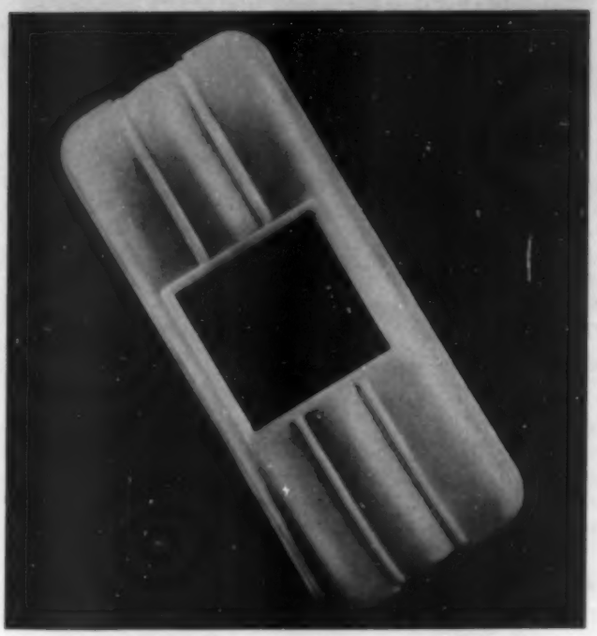

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A large overhead bus light, as pictured, is certainly an outstanding example of skilled adaptation in plastics. It was also designed to make possible—controlled diffusion of light. The possibilities in plastics are unlimited and practically every manufacturer has some item which can be advantageously adapted to molded plastics. If you have an item send it in today or when you are in the market again—Be Sure—Specify Waterbury Plastics.

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DETROIT . CHICAGO . TORONTO

REFLECTING SOUTHWARK'S ABILITY TO MANUFACTURE MIRROR FINISHED

Steam Platens

For use where very fine finish of product is essential. This steam platen is 60 in. by 240 in. by 3 in. rolled steel with drilled steam parts.

BALDWIN-SOUTHWARK CORP.
SOUTHWARK DIVISION, PHILADELPHIA
Pacific Coast Representatives:
THE PELTON WATER WHEEL COMPANY, San Francisco

SOUTHWARK

Plastics patents

the use of a plastic facing on the surface to be decorated. The selected design is reproduced by a photogravure process on a polished surface such as glass, and fixed by coating with a pigment and then applying a layer of plastic over the pigment. The artificial stone, in contact with the pigmented plastic design, can be set and then stripped away from the glass, taking with it the layer of cellulose ester or whatever carrier may have been selected to form the marble finish layer. (Karl Eichstadt, Oxford Varnish Corp., Detroit. U. S. Patent, 2,069,227.)

●

Another new idea for the building trades is a plastic sealer for plugging holes in walls or the like. Asbestos powder is mixed with a solution of celluloid in amyl acetate to the desired consistency. The composition sets to a hard, impermeable material which effectively stops up holes or cracks and is easily applied. Instead of asbestos a cement powder or a fibrous filler may be used if desired. (Noel Phillips, French Patent 800,165.)

●

In making molded bearings (ball or roller type) with a synthetic resin lining a cylinder or sphere is placed concentrically inside a ring or a larger sphere and a synthetic resin composition is forced into the space between the two. As the resin cools and hardens it shrinks away from the outer ring or sphere. For firm adhesion of the outer synthetic resin face of the bearing to its core, the cylinder or sphere may be ribbed or knobbed so that the plastic resin is forced into the interstices and around each rib or knob. (E. Bisterfeld, 9 Bahnstrasse, Radevormwald, Germany, British Patent 455,590.)

●

A convenient method for fabricating toilet seats is to make a wood core, drilled with the requisite holes for bolting the seat to the hinge, and to face this core with a plastic composition which completely covers the core with one continuous unbroken impervious layer, even lining the holes drilled in the core. The wood is thus thoroughly protected. (Geo. W. Carlson, C. F. Church Mfg. Co., Willimansett, Mass., U. S. Patent 2,069,301.)

●

The function of signs is to attract and hold attention, and many devices have utilized plastics to this end. One of the newest uses a simple and convenient method for imparting knobbed or studded surfaces to transparent or translucent sheets of cellulose acetate or nitrocellulose plastics. Novel effects are obtained in this way with panels of the thermoplastic by rolling the panels between two drums, one smooth and the other formed with cavities in the shape desired for the projecting knobs or studs. The plane face of the panel is coated with a translucent paint to allow light striking that side to be transmitted, while light falling on the knobbed face will be reflected. This gives attractive optical effects which instantly draw the attention of observers to the lettering on the sign. (M. Rouyrre, A. R. Bohm and G. C. Vaughan-Morgan, 16 Victoria St., Westminster, England, British Patent, 456,-398.)

●

In the art of making electrical resistances from a synthetic resin binder and a current-carrying powder difficulty is sometimes encountered because of the high temperatures required to set the heat-hardenable resin in making the shaped resistances. To eliminate troubles arising from this source a new composition has been developed for molding resistances at moderate temperatures without sacrificing the advantages of using the synthetic resin (heat-hardenable) binder. A mixture is used in which the synthetic resin is compounded with the correct proportion of conducting or semiconducting powder to give the desired electrical resistance. To these ingredients a hardening agent is added, i. e., a small proportion of a catalyst which accelerates the hardening

Plastics patents

of the resin. This catalyst may be hydrochloric acid, or a solution of ammonia, or sodium benzoate. The proportion depends on the substance and on the degree of acceleration to be obtained, but in any case only relatively little catalyst is needed. (Steatit-Magnesia Akt.-Ges., French Patent 801,942.)

●

With the aid of thermoplastic synthetic resins the inlay method of decorative design, with its infinite possibilities of variation to suit individual tastes and needs, is now applicable to wall coverings. For example, a thermoplastic vinyl resin may be used as the backing in which inlays are set. A sheet material, suitable for wall covering or for other purposes is made with openings to receive the inlays, which are set in place so that the sheet material and the inlays come in contact with the fused thermoplastic resin and are thereby bonded together and held in the correct positions according to the desired design. (Edw. C. Sloan, assignor to Jesse B. Hawley, Geneva, Ill., U. S. Patent 2,069,393.)

●

Taking an alkyd resin away from its usual function as a varnish ingredient, a molding composition has been prepared which is especially useful for making switchboard panels. A mixture of linseed (or tung) oil and a copal resin is first blended with a like quantity of asphalt and a small proportion of a manganese linoleate drier at about 445°F., and this product is mixed with an alkyd resin at about 240°F. To make a molding composition suitable for switchboard panels the resulting resin, 19 parts, is compounded with 80 parts of asbestos and 30 parts of powdered Portland cement with enough water to set the cement. The panels are molded under a pressure of about 150 to as high as 600 atmospheres and hardened by baking at temperatures from 150 to 240°F. These panels provide good mechanical and electrical properties at a moderate cost. (Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, German Patent 626,985.)

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Packaging conference

At the seventh Annual Conference and Exposition of Packaging held at Hotel Pennsylvania, New York City, recently, Benjamin F. Conner, manager of the plastics division, Colt's Patent Fire Arms Mfg. Co., presented a paper "What's Ahead in Plastics Packaging." He predicted that within a few years plastics will replace many of the commonly used materials in packaging applications and indicated that cost, which will be rapidly lowered through improved technique and increased production, will be the determining factor. He pointed out that the advantages of permanent color and lightness of weight inherent in plastics, together with research being conducted by Mellon Institute and materials manufacturers will speed this development amazingly in the near future.

D. S. Hopping, director of sales, packaging division, Celluloid Corporation, presented a paper "Semi-Rigid Transparent Materials in Modern Packaging—The Pros and Cons," in which he pointed out the trends and advantages in this direction, explained the effect of the current demand, and set forth some of the limitations of the materials.

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Exhibits at Radio City

The Beetle Products Division of the American Cyanamid Company announces that it has taken a large display space at the Metal and Plastics Exhibit, Inc., International Bldg., Radio City.

Beetle Products has long felt that a well rounded and complete exhibit of the uses of urea plastics, located in the highly populated heart of Radio City, would do much to familiarize the public with products molded from Beetle, and that it would also serve the molders as an excellent point to exhibit their products.

The exhibit will display products, both molded and laminated, and will give due credit to the fabricators of these parts. It being impossible to show all products at one time, a rotating exhibit will be established so that frequent changes will coincide with the seasonal markets for products molded of Beetle.

Among other exhibitors of the plastic field are: Resinous Products & Chemical Corp., Röhm & Haas Co., Thiokol Corp., Marblette Corp., and E. I. du Pont de Nemours, Inc.

For larger injection moldings

Interest in injection molding and the improvement of equipment to satisfy increasing demands are keeping pretty well in pace with one another. To meet the requirement for larger injection moldings, machines of greater capacity are being built. The new plastic injection molding machine recently announced by Reed-Prentice Corporation, will inject 24 sq in. or 2 oz. per shot. This is a fully automatic hydraulic press and several major changes have been made in its construction since it was originally announced in November.

For example, the drive motor and control for hydraulic pump are now mounted outside the cabinet of the machine in order to permit the use of a standard open type ball-bearing motor instead of a fan-cooled motor, which was necessary in the original model. The automatic timing control consists of three timing units adjustable from 1 to 120 seconds. Each of these contributes to the automatic operation of the press. One determines the time the pressure stays on the plunger, one determines the period for solidification of the material, the other controls the time required for the molds to open and eject the product. When the machine is manually operated, it is controlled by two levers, one for closing the mold, the other for operating the injection cylinder.

The entire toggle end of the machine is now adjust-

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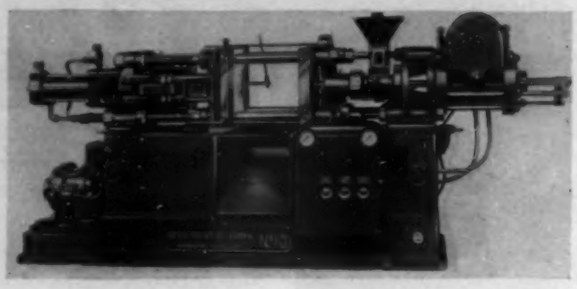


able to permit accurate and ready set-up of molds and to make adjustments for variations in mold thickness. The injection cylinder end of this machine is adjustable to permit the speedy dismantling and change of the heating unit as well as to clean and accurately position the injection nozzle.

This molding machine includes an electric heating unit and rheostat for heating the material and provision is made for a thermometer or thermocouple for temperature control of the material before injection. A safety device and automatic knock-out for the molded product is also provided. Die plates can be supplied to accommodate the customer's own molds and the distance between these die plates can be increased to 24 inches.

Program of Chapel Hill meeting

The program of papers on plastics to be presented on April 14 at the Chapel Hill meeting of the American Chemical Society under the auspices of the Paint and Varnish Division is shown below.

Symposium on Organic Plastics
G. M. Kline, Chairman

9:00 A.M.—A. G. Hovey, Beck, Koller and Company, Inc., Strange Alkyd Resins.

9:00 A.M.—Wm. Howlett Gardner, Shellac Research Bureau, Shellac, The Parent of Modern Plastic Resins.

10:10 A.M.—William Koch, Hercules Powder Company, Inc., Ethylcellulose, Properties and Uses.

10:45 A.M.—T. A. Kauppi and S. L. Bass, Dow Chemical Company, Evaluation of the Properties of Ethylcellulose by the Use of Load-Elongation Curves.

11:20 A.M.—T. P. Sager, National Bureau of Standards, The Permeability of Organic Polysulfide Resins to Hydrogen.

Symposium adjourned Wednesday afternoon to permit attendance at High Polymer Symposium of the Division of Physical and Inorganic Chemistry.

Thursday morning, April 15.

9:00 A.M.—J. H. Clewell and H. W. Paine. The Use of Pigments, Lakes and Coloring Materials in Plastics.

9:40 A.M.—R. H. Kienle, Calco Chemical Company, and R. Bowling Barnes, Princeton University, Infrared Spectroscopy and Organic Chemistry. III. Glyceryl Phthalate.

10:20 A.M.—H. L. Bender, Bakelite Corporation, The Structures and the Properties of Heated Resinous Films.

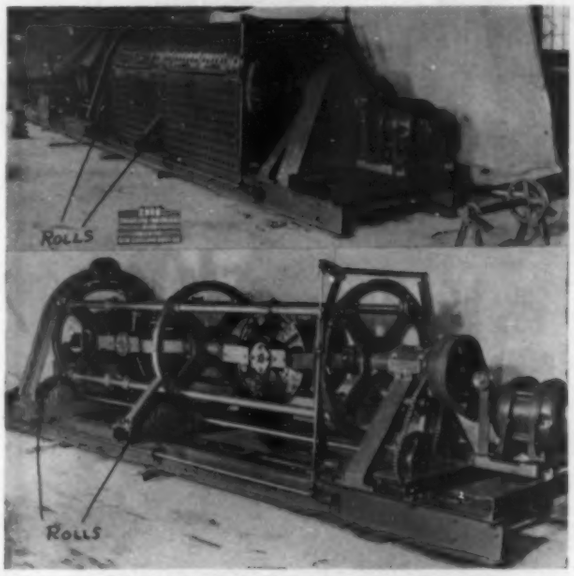
Plans for the organization of a plastics group either as a separate division or as part of an existing division will be discussed immediately following this symposium.

Plastic rolls replace cast iron

Editor, MODERN PLASTICS:

It will no doubt be of interest to you to know how molded plastic materials are used in a certain type of wire machine for twisting small electrical cords.

This machine consists of a revolving rotor, one end of which revolves in a fixed bearing, the other end being supported on rolls, $11\frac{1}{2}$ in. in diameter. The rotor is made up of large steel discs connected together by and driven through steel rods as shown in the accompanying photographs. The small supporting rolls which bear the weight of the rotor are usually made up of either cast iron or steel.



These two photos show an interesting use of molded plastic rolls in a twinning machine made by New England Butt Co. The application is fully described in Mr. Scott's letter presented here

In this particular machine shown, the peripheral speed was 4850 ft per minute. When this machine had been operated on the test floor for less than one hour, the surface of the supporting rolls showed appreciable wear. This was due to the fact that there was very little resilience in the cast iron to take the shock of this steel rotor in operation.

As a solution to this problem, a molded plastic roll was substituted for the cast iron roll. A molded roll of chopped canvas filled material was used. This roll

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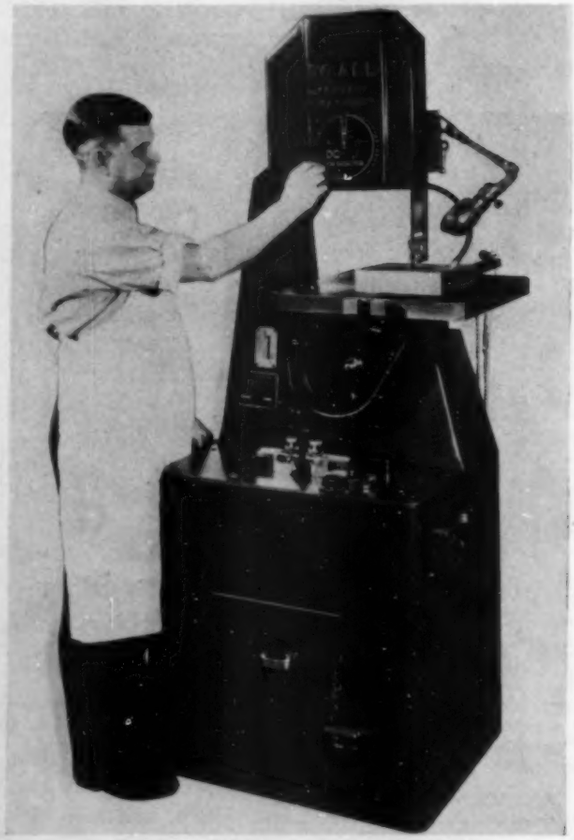
shows no wear after having been in operation for some time, and has also reduced the noise by a considerable amount.

Yours very truly,
(signed) R. M. Scott
Chief Engineer

New England Butt Co.
304 Pearl Street
Providence, R. I.

Tune in to saw

A new model Doall contour sawing machine has just been placed on the market by Continental Machine Specialties, Inc. It is known as the Doall Contour Machine. A dual dial control is the major improvement which this new machine tool incorporates. The most important factor in narrow band, contour sawing is the correct speed of the saw for each material, and for each



thickness of job. Each different thickness of work and each different material necessitates a different sawing speed. The same is true in filing or polishing when the Doall is used for these functions.

A dual control dial, built into the Doall machine, is mounted on the hinged door which is a feature of the new model. After the manner of modern radio dial selections, this dial lists 48 different materials. They

are in alphabetical order around the rim of the dial, beginning with aluminum and ending with zinc.

In addition to dialing the correct sawing and filing speed, this ingenious control also translates the correct saw to use for each material. That is, it shows the correct selection of saw as to "pitch," "temper," and "set" for each of the 48 different materials. Other improvements in this new Doall Contour Machine are an improved lap grinder, a new wider adjustment in the saw guide, and greater ruggedness throughout.

Organizing committee on plastics

A committee on plastics is now being organized by the American Society for Testing Materials. An organizing group has been appointed whose duty it is to select a tentative list of members for the committee and to make recommendations as to the scope of the work to be done by the committee. This organizing group consists of the following:

W. E. Emley (Chairman), National Bureau of Standards, Washington, D. C.
W. S. Landes, President of the Celluloid Corp., New York City
L. M. Currie, National Carbon Co., Cleveland, Ohio
J. C. Pitzer, Formica Insulation Co., Cincinnati, Ohio
W. A. Evans, Bell Telephone Laboratories, New York City
T. Smith Taylor, Professor of Physics, Wash. & Jeff. College, Washington, Pa.
G. J. Esselen, Consulting Engineer, Boston, Mass.

The first meeting of the group was held in Pittsburgh, Pennsylvania, on February 24th.

Chicago representative

The Eclipse Molded Products Company of Milwaukee, Wisconsin, recently announced the appointment of A. J. Cox Company, 11 South Desplaines Street, Chicago, as their representative.

World's Fair space being allotted

The New York World's Fair announced recently its scale of prices for exhibit space in the great 1939 exposition in Flushing Meadow Park, Queens. For building lots the base price will be 20 cents per square foot, for interior exhibit space $14 per square foot.

The announcement made by Grover Whalen, president, constituted in effect an invitation to business and industry and the arts and sciences to start preparing their own Worlds of Tomorrow for 1939. Mr. Whalen said discussions would begin at once with the hundreds of firms which had inquired about participating in the Fair. Many of these were said to have been waiting only for information about lot areas and space charges to begin making definite plans for their exhibits. The Fair Corporation placed on the market 75 acres of building lots and announced that 450,000 square feet of net

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floor space would be available for exhibitors in the buildings which the Fair itself would erect.

Exhibits at the Fair will be concentrated in the area between Horace Harding Boulevard and the Long Island Railroad. A total of ninety plots in this section have been set aside tentatively for the buildings of private exhibitors. They range in size from 5000 to 362,200 square feet (8.32 acres) and in price from $3300 to $59,000. Their size and shape is not fixed, however, and may be altered to suit exhibitors.

Stokes to build and sell "Standard" Preform Presses

Announcement is made to the trade by both companies concerned that exclusive rights to manufacture and sell the well-known "Standard" Preforming Presses have been acquired by the F. J. Stokes Machine Co., of Philadelphia, from the Standard Machinery Co., Mystic, Conn. These presses, to be known in the future as "Stokes-Standard," are of the toggle type which prevents jamming on centers. They are ruggedly built for exerting the higher pressures required by certain molding compounds and in forming large size preforms up to 4 inches in diameter with a 4-inch die fill, or requiring pressures as high as 80 tons. There are more than a score of these presses already in service with an unbroken record of standing up under the heavy pressures exerted.

CLASSIFIED

WANTED—PREFORM MACHINES: Will pay cash for idle or surplus preform Presses—also Hydraulic Presses, Pebble Mills, Mixers, Sifters, etc. Send us your list. Consolidated Products Co., Inc., 13-14 Park Row, New York City.

•

FOR SALE: 1—Colton 4½ Preform Machine 1½", with Texrope drive and motor—also 1—Colton Special #37 Rotary Preform Machine for large capacity—will make preforms up to 2½" dia. Condition like new—Original cost $6800, price $2000—also 2—Colton Rotary #2, ⅝"—also 1—Stokes O, single punch, ¾"—also 1—Watson Stillman Hydro Pneumatic Accumulator. Reply Box 181, Modern Plastics.

•

WANTED—An outstanding, financially responsible, manufacturing company is interested in acquiring a small complete plastics plant that may be used as a subsidiary. Or would entertain proposition of financial interest in present going business making plastic products. Must be located in Chicago. All replies held strictly confidential. Reply Box 187, Modern Plastics.

With this type of press and its other single punch and rotary models for lower pressures and smaller preforms the Stokes Company is in a position to supply preforming equipment for every requirement.

Mica Insulator completes unusual safety record

With the recent announcement of awards for the twelfth annual Accident Prevention Campaign of the Associated Industries of New York State, the General Advisory Committee, meeting in Buffalo, paid tribute to a unique safety record of Mica Insulator Co. of Schenectady, N. Y. An award was made to that company for completing the 1936 campaign with a 100 percent record of no lost-time accidents. In addition they were awarded a special trophy for having completed the last five annual campaigns with the same record.

Industrial consultant in London

G. Norman Higgs, recent visitor to this country writes that he has established an office and laboratory at 67 Oldfield Lane, Greenford, Middlesex, England, where he will be available to all industry as consultant. Mr. Higgs has had broad experience in metals as well as plastics. He was formerly a director of Synplas Ltd., a plastic molding company located in London.

Design awards to molders

British Plastics announces a program of Design Awards to be given each month. Molders are invited to submit examples of their work which will be reviewed by Walter Landauer, industrial designer, who will act as judge. A certificate of award will be presented to the molder submitting the part which in Mr. Landauer's opinion is most deserving. Winning entries will be pictured in *British Plastics* and all moldings submitted will be displayed in a permanent exhibit to be established at the offices of that publication. At the end of the year, that is—after twelve awards have been made, a panel of five judges will be called together to review the year's output of British moldings submitted.

Du Pont exhibits at Museum

The Du Pont Company is sponsoring an interesting exhibit of "Better Things for Better Living Through Chemistry" at the N. Y. Museum of Science and Industry, RCA Building, Radio City. It began with a preview and Fashion Show, Mar. 31, to continue for one month.

National Premium Exposition

Children from 4 to 12 years old will relate in their own words, their reaction to current premium offers in a "Child's Premium Exposition," one of the features of the Round Table Conferences held in conjunction with the Seventh Annual National Premium Exposition, to be held in Chicago at the Palmer House, May 3 to 7.

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"With interest in premium advertising gaining every day," said Howard W. Dunk, secretary of the Premium Advertising Association, "we anticipate an attendance of over 2000 buyers at the Chicago Meeting."

Petzold now with Gorham

William Petzold, formerly with the General Electric Company, has recently joined the designing staff of Gorham Company, Providence, R. I. His creative genius and his long experience with industrial design will find expression in both the Bronze Division and the Plastics Department at Gorham.

Marvel heads Design Laboratory

Pressure of private business has forced Gilbert Rohde to resign as director of Design Laboratory which his enthusiasm and untiring service helped to create. He will remain, however, as Chairman of the Advisory Board. Josiah Marvel is now director.

New impact-resistant molding materials

Many molded plastic parts, due to the conditions under which they are used, require better resistance to shock or impact than is afforded by general purpose molding materials. In order to meet the varied requirements for impact strength, Bakelite Corporation has developed a new line of Bakelite molding materials which range in impact strength on an A.S.T.M. standard test specimen from 0.22 to 2.0 ft. lbs. energy to break (2.75 to 25 ft. lbs. per inch square). Generally speaking, these molding materials may be classified as improved impact, medium impact, medium-high impact, and high impact. In each classification there are now two or more molding materials. Thus, this range of materials provides molded parts, in addition to impact resistance, with other properties such as chemical and water resistance, or dielectric properties. These new molding materials are particularly suitable for handset telephones, golf club heads, football shoe cleats, instrument cases, junction boxes, oil well equipment, rayon spinning buckets and other parts requiring relatively high impact or shock resistance.

New low-loss plastic

A new phenolic molding compound with an extremely low power factor has recently been developed by General Plastics, Inc. For use on high frequency radio and electrical equipment, this new material—known as Durez 1601—has a power factor (A.S.T.M.) of 0.34%, which is considerably lower than any material of its type. It also has excellent molding qualities which permit its use for a variety of applications such as x-ray machines, diathermy apparatus, high frequency measuring and research equipment, short wave radio parts, etc.

BOOKS OF THE MONTH

British Plastic Year Book, 1937

Published by The Plastics Press, Ltd., London
Price 15/ plus postage and tax

The seventh volume of the *British Plastics Year Book* which deals exclusively with plastic materials and their products was issued late February. The same arrangement of sections has been retained, but in response to a wide demand, a new section which contains a commercial "Who's who" of persons actively engaged in the plastics industry is included.

The editorial section carries a résumé of progress in all plastics fields together with interesting descriptive matter and tables outlining the advantages of the various materials. There is a story on the manufacture of cellulose plastics, another on cellulose acetate, one about injection molding of thermosetting resins, thermoplastic resins from aniline condensation products, decorative plastics, methacrylate resins and many others.

One section is devoted to picturing plastics progress in Great Britain during 1936. Another to picturing the application of plastics in the U. S. A. The real meat of the issue, however, is the complete directories of those engaged in any way in the plastics industry in Great Britain separated with indexed sections for easy reference. These sections include: names and addresses of associations, world plastics journals, trade inquiry offices, etc.; proprietary names including all those registered names of materials in use throughout the British Empire; materials; plant; manufactured products; associations; who's who in the industry; and miscellaneous data. A good associate volume alongside MODERN PLASTICS CATALOG AND DIRECTORY for any library. (E. F. L.)

Toute L'Industrie des Matieres Plastiques

Volume I and II
by J. Delorme
Published by L'Edition Technique. Price, 225 Frs. per volume

Two volumes of the three which are being published on the entire industry have just arrived. The third we understand is in the process of being printed.

The introduction to Book I gives a definition of plastic materials as well as a brief summary of what is included in the book. Dates and discoveries by such men as Hyatt and Baekeland, etc., are listed, and the classifications of plastic materials together with their peculiarities and characteristics.

This volume of 346 pages deals with basic materials, plasticizers and solvents. A book which is both elementary and advanced in its presentation, has several diagrams, many tables and a few illustrations.

Book II, 430 pages, tells how each classification, such as casein, pyroxylin, phenolic, etc., is made, what chemicals are involved and precisely how the chemicals are

BOOKS OF THE MONTH

put together to make compounds which will eventually be manufactured into plastic merchandise.

The third book, which we have not yet seen, will deal with the properties and the actual utilization of these materials for molding, fabricating, etc., and will tell for what applications each is best suited. J.M.

Distillation

by Joseph Reilly
Published by the Chemical Publishing Company
Price $1.25

A small book of 120 pages on Distillation by Professor Reilly recognized authority on the azeotropic process, is an attempt to summarize recent developments in the theory and practice of distillation. Replete with formulas and diagrams the book is divided into seven sections dealing with fractionation, production and measurement of low pressure, vacuum fractionation, azeotropic mixtures, distillation in a current of steam, destructive distillation and sublimation.

A two-page index makes this monograph of value as a permanent reference book on the subject to both the student and the manufacturer. J. M.

Barco bulletin

Barco Manufacturing Co., manufacturers of swivel joints for platen presses, have just issued a four-page bulletin showing a number of successful applications in actual use. There is a chart of dimensions and a diagram showing recommended alignment of the swivel joint in service. Photographs of standard joints and parts are shown together with their symbol numbers.

Ethyl cellulose in adhesives

Hercules Powder Co. has just issued a booklet under this heading which gives a clear and concise description of just how ethyl cellulose can be best used in this field. Formulas for use are given as well as charts showing compatibility, behavior and solubility of ethyl cellulose and other cellulose derivatives.

Bioptix and Micro-Optical pyrometers

The Pyrometer Instrument Company has issued a new booklet in which these new optical pyrometers are pictured and described. The Bioptix is a new combined, patent color pyrometer for technical and scientific measurements by which the temperature of the "black body" and the actual temperature may be ascertained simultaneously. The measuring range is from about 900 to about 1900 deg. C.

The Micro-Optical pyrometer is a special instrument for measuring the temperatures of very small objects such as incandescent lamp filaments, etc., and for scientific research. Twenty-fold magnification is pro-

vided by means of an optical arrangement of high candle power. This company also makes all sorts of pyrometers for use in the plastic molding industry, some of which are pictured in this booklet—free for the asking.

Index to A.S.T.M. Standards

The American Society for Testing Materials has recently issued its 1937 index to A.S.T.M. Standards and Tentative Standards.

Plastacele molding powder

E. I. du Pont de Nemours & Co., Inc., recently released a 24-page booklet in which the infinite uses of Plastacele molding powder are pictured and described. Details of injection molding are clearly indicated and there is an exceedingly important chapter on Injection Mold Design which should be widely read. Compression molding of Plastacele is also explained, as are machining and finishing operations.

Store fronts

Twelve proposed store fronts constructed of Formica, a laminated plastic building material, appear in natural colors in an interesting portfolio just published by Formica Insulation Company. Dimensions and working instructions are included together with prices of materials required for each installation. The designs are modern and practical for the purpose of display because of the wearing qualities and finish.

A Guide to Modern Packaging

A comprehensive fifty-two page illustrated booklet has just been published by the Bakelite Corporation. The first section is written for the convenience of the package designer and manufacturer who is interested in creating new packages or redesigning old ones, where plastics are involved.

Part two of the book explains the advantages of Bakelite materials for use in packages and closures. It contains information regarding the best procedure in adapting these materials to packaging requirements.

An eight-page supplement called "Bakelite Molded Closures for Wines and Liquors" describes a great many types of plastic closures which are popular with rectifiers, distillers and vintners, and points out that there is a particular type of Bakelite material for each application required by a manufacturer.

Why Beetle is preferred

This is the theme of a smart new twelve-page booklet issued recently by the Beetle Products Division of American Cyanamid Company under the title, *Adding Beauty of Sight to Beauty of Sound.* It is addressed to those manufacturers whose product lends itself to urea plastic housings, particularly radios, and to molders who mold them. The booklet is elaborately illustrated with

BOOKS OF THE MONTH

contemporary radios in which Beetle is used and indicates Beetle's place in the trend toward better radio design. It illustrates and explains the four forms of Beetle, and designates the special advantages of each for special purposes in radio design. The final page is devoted to outlining the more important electrical properties of the molding material.

Oh my gosh!

R. B. H. Lacquer Base Company recently published a folder which indicates (mildly) the profanity used by technicians when things go wrong. It is pointed out that the presence of an RBH Kit would relieve such situations and it tells how those interested in pigment dispersions may obtain such kits.

Technical book catalog

For the first time, there is now available a comprehensive catalog of technical books of all American and British publishers. Thousands of books are listed and each is fully described in the attractive, spiral-wire bound catalog No. 4 of the Chemical Publishing Co. Because of the expense in getting up this catalog, a charge of ten cents is made to cover mailing expenses.

The Plastics Bulletin

A new publication has entered the plastics field in England. Called *The Plastics Bulletin*, it is published weekly by Quinn Press, Ltd., 25/ Post free.

Processing kettles

The Patterson Foundry & Machine Co. has just issued an interesting and attractive four-color folder titled: "From the Lowly Soy Bean to Sparkling Automobile Finishes," which indicates the processes of converting the oil from soy beans, as well as other vegetable oils, to durable automobile finishes by the use of electric kettles. It also indicates the use of these kettles in other industries such as foods, confections, cosmetics, paints, inks, synthetics and chemicals. Free for the asking.

Idea Kit

Harald J. Torgesen, consulting art director, has sent us a copy of his "Idea Kit" which turns out to be the most advanced prospectus in advertising and printing arts that we have seen. The cover, an actual red-brown wood veneer mounted on heavy board, has its title cut through in such a manner that the letters and a medallion are reflected from a sheet of copper foil which becomes the first inside page. The book is bound with a red plastic spiral binding by Brewer-Cantelmo.

Plastics appear again inside the book where a page of amber Plastacele is used to illustrate the effect of color

upon both background and photography. This page is framed in a printed design of purple and blue-green and clearly indicates the possibilities of cellulose lacquers and sheet cellulose for creating unique presentations of the printed message. Quite naturally the book is illustrated with character photography in which the humorous little modeled figures that distinguish Mr. Torgesen's work are shown.

MERCHANDISE DISPLAY

(*Continued from page 31*) played. A permanent staff of seventeen artists and craftsmen are retained at Kaufmann's for this purpose.

Interior display presents a different problem, but one which must produce similar results. Each ledge piece or display case must tell its story simply, effectively, alluringly, to lead the customers from one department to another to stimulate and increase sales. Here, too, correct lighting, fine artistry and craftsmanship combine to reduce display work to a science.

The urge for more simple and refined means of display expression has motivated a search for more modern materials until plastics have found a definite and useful place in display. Last year, to execute one of Mr. Gabor's ideas, Catalin was proposed. The main floor with its black Micarta columns, frosted glass panel lighting and white mahogany display cases, has always presented a problem in Christmas decoration, but this red translucent plastic with tiny star lights proved a happy solution. The material was ordered in sheets and the cutting, bending, drilling and buffing were done in their own display shop.

This inaugural use of cast plastics was so well received that a definite field for this material in store display has been found. Its physical properties make it workable with meager equipment. The fine coloring and polished brilliance lend themselves to simple forms, the very essence of well-designed units. Small fixtures for permanent or seasonal use are easily and quickly made. The natural luster of the material retains its fresh and sparkling appearance even after considerable use and can be simply renewed at any time by buffing. The photographs show how plastics have been used to "set the stage." To what heights plastics will attain in Modern Display is problematical. At Kaufmann's they have just begun.

A NEW MATERIAL: ETHYL CELLULOSE

(*Continued from page 46*) tinued heating. Ethyl cellulose which has been subjected to acid treatment frequently embrittles on aging, and this fault can be readily checked by observing the behavior of a film heated for several days at 110–120° C. A great number of the uses so far developed for ethyl cellulose depend on its toughening action on oils, waxes and resins; its flexibility; and the fact that it can often be applied by heat. Thus it is finding application as a thermoplastic adhesive for transparent wrapping material; and as a bodying mate-

rial in heat transfers to textiles. In the plastics field its progress has been relatively slow, chiefly because of the high price of the material. The lacquer field naturally emphasizes the flexibility and chemical inertness of ethyl cellulose in flexible lacquers for rubber, cloth and paper; bronzing lacquers; mixtures with drying oils.

Physical Properties of Ethyl Cellulose as Determined by the Hercules Experimental Station.

Melting point	200–210° C.
Softening point	110–130° C.
Specific gravity	1.14
Bulking value in solution	0.1 gal. per pound
Refractive index	1.470
Dilution ratio	More favorable than cellulose esters
Moisture permeability of film*	2.72×10^{-6} g/hr/cm²/cm
Moisture absorption at 80% r.h.	3.4%
Light transmission	Practically complete between 2800 and 4000 A°
Light discoloration	Similar to cellulose acetate; superior to nitrocellulose or benzyl cellulose
Breaking strength of film (unplasticized)	400–600 kg per sq cm
Elongation of film (unplasticized)	10–20%
Dielectric constant 1000 cycles	3.9
Power factor 1000 cycles	0.25%
Dielectric constant 60 cycles 25° C.	2.6
Dielectric constant 60 cycles 100° C.	2.9
Power factor 60 cycles 25° C.	0.3%
Power factor 60 cycles 100° C.	0.6%
Dielectric strength of film	1500 volts per mil

*Addition of 10% wax, which dissolves completely in the film, reduces this to less than 1/25 of this amount.

DEVELOPS FILMS, TOO

(*Continued from page 27*) impervious to developing chemicals, resistant to acids, water-proof and water-tight, stainless, non-corrosive and not subject to discoloration. Numerous metal inserts required accurate forming of the molded parts and uniform precision for quick assembly. The plastic materials which were selected meet all of the specifications and in actual use have proved to be entirely satisfactory; serving the purpose with an efficiency that might not have been accomplished otherwise.

Consolidated Molded Products Corporation molds the plastic parts of Durite for Ryerson Haynes, Inc., who manufacture the complete outfits for the Photo-See Corporation.

SHRINKAGE AND SWELLING OF WOOD REDUCED

(*Continued from page 42*) impregnation of the coarse capillary structure by placing the wood in a treating cylinder, evacuating, running the solution into the cylinder so as to completely immerse the wood and then applying a pressure. This preliminary treatment is advantageous only in the event the lengths of the wood specimens in the fiber direction are not great and the species are among those easily treated, as the penetration of the solution is almost entirely in the fiber direction.

The phenol-formaldehyde solution has a great affinity for wood, as is shown by the fact that the wood swells more in it than in water alone. After standing in the solution a sufficient time to allow the resin-forming solution to diffuse into the cell walls, the wood is slowly dried so that further diffusion of the resin-forming materials into the cell walls accompanies the removal of solvent. The wood is then cured at about the boiling point of water. This heat treatment causes the phenol and the formaldehyde to react to form a resin which is water-insoluble. The moisture-excluding efficiency obtained appears to be permanent and the wood can be cut and nailed without affecting the efficiency. The moisture-excluding efficiency in percent, $E = 100\left(\frac{S_0 - S}{S_0}\right)$, in which S_0 is the swelling or shrinking of the control between any two relative humidity conditions and S is the corresponding swelling or shrinking of the treated wood, increases with the concentration of phenol and formaldehyde used up to a maximum value of about 70 percent for a single treatment. This efficiency can be somewhat increased by multiple treatments. The necessary amount of resin formed in the structure to give a moisture-excluding efficiency of 70 percent will vary with the species and density of the wood from about 30 to 50 percent of the weight of the wood. Efficiencies as high as 50 percent have been obtained with as little as 15 percent increase in the weight of the wood.

Not only are the swelling and shrinking of wood permanently reduced by this treatment but the mechanical properties are improved as well. The hardness and the compressive strength at the proportional limit perpendicular to the grain are increased considerably. Maple containing about 20 percent of its weight of resin gave increases of over 50 percent in each of these properties. Compressive strength parallel to the grain is increased somewhat less, and static bending properties and toughness are not affected.

Gluing tests showed that the treated wood can be satisfactorily glued with animal or casein glues. Excellent results were obtained with Bakelite glues, using the hot-press, but not the cold-press technic. Plywood glued with phenol-resin film or with casein glue was successfully treated with the synthetic resin without affecting the glue joints.

The present limitations of this process are the size of specimen and species that can be treated and the cost of treatment. Not all woods can be successfully treated

because of the difficulty of getting the treating material distributed throughout the structure. A number of softwoods, the sapwood of a number of hardwoods and the heartwood of the softer hardwoods have been successfully treated in specimens 14 by 4 by 1 inch in size. The largest specimen successfully treated to date is 30 inches long by 5 by 5 inches. Larger specimens of the more readily treated species could undoubtedly be treated but the treatment would take prohibitive lengths of time.

On the basis of the complete treatment of the wood the cost would be about 40 cents per board foot. This figure is at least ten times the cost that could economically be added to millwork to minimize the dimension changes. Even at present costs the treatment might, however, be economically applied to such specialties as lithograph backings, shoe lasts, shuttles, wood bearings, small handles, and athletic goods.

As the cost of the treating process is mostly that of chemicals, there are possibilities of cutting costs by further reducing the amount of chemical needed. Although attempts are now being made to do this, theoretical considerations indicate that the probability of going far in this direction is small. In this age of synthetic resins it is quite possible that the cost of the raw materials will be further considerably reduced. Then, too, there is the possibility of treating only the outer $^1/_{16}$ to $^1/_8$ inch of large specimens. However, this eliminates the advantages of the process over other surface coatings.

The process is thus of practical value at the present time only in specialty fields. Research along these lines is being continued at the Forest Products Laboratory. With the aid of the fundamental information and background gained to date, it is hoped that further efforts will yield results of more widespread use.

MOST FIREPROOF SHIP AFLOAT

(*Continued from page 21*) to designers, is the character of the surface of laminated plastics. It possesses an unusual hardness and a certain translucence which makes it compare favorably in appearance with vastly heavier materials. These heavier materials, if used, must be of greater thicknesses and become objectionable because of weight since the elimination of weight is an all-important consideration on shipboard. Heavy materials possessing equal hardness, such as glass, marble and enameled steel used at times to obtain a durable, fireproof and attractive interior when the size of the ship permits their adoption, are frequently cold both in appearance and to the touch. A column, surfaced with laminated plastics, does not give the appearance of being painted, but seems to be built of some sturdy material of fine, hard texture. In the same manner, a door surface can be made more attractive and more durable than a high-grade wood door such as is used in non-fireproof or fire-resisting construction. However, speaking of doors and the like for large, first-class

passenger ships where precedent in design is followed to give the passenger handsome wood veneered spaces with which he is familiar, it is now a commercial possibility to obtain wood veneers which have been treated with plastic resins. The veneer is thoroughly impregnated to produce a hard surface with all the qualities of ordinary laminated plastics and the natural beauty of wood.

Treated wood veneers can be, and actually have been, applied to fireproof surfaces with the same facility that regular laminated plastics are applied. Where weight is an important factor, such as in a door in public spaces, a substitute for the usual wood door can be obtained in the following manner: Thin sheet steel is insulated with metal coating and very thin fabric. The resin treated wood veneer is applied to the surface under high pressure in the presses used to make laminated plastics, to produce an indestructible sheet of unusual appearance. Doors can be made by mounting such sheets on a light metal frame. In this way we have obtained a hollow steel door for such important locations as fire screen bulkheads forming the main transverse subdivisions of the ship. The value of insulating the sheet metal before applying the impregnated wood veneer allows for the difference in expansion of wood and steel insuring the bond between the two materials. Such a door, in fact, all the doors described, would serve as an absolute fire stop and prevent a conflagration from entering an adjoining space, while flame-proofed wood in the solid state would eventually char away completely and leave the door opening as a free passage for fire in extreme instances.

Name and number plates throughout the ship were made of engraved laminated plastic one-eighth of an inch thick with a white core and black outer surface. The appearance of this was superior, in the opinion of the writer, to porcelain or metal plates which usually involve some upkeep. Drawer pulls and pulls for cabinet doors were molded plastic which should prove superior to plated metal, as plating in time wears off and fittings must be taken ashore at some convenient time to be replated.

In the vessel under consideration the flat bulkhead and ceiling surfaces of fireproof material were painted in the usual warm, pleasant colors employed on woodwork, and whatever mouldings were used, were of fireproof composition treated in paint or antique gold or silver finish. Many mouldings were actually of non-ferrous metal to protect edges from injury. Connections between certain flush panels were made of satin finish, non-ferrous metal to modernize the appearance and to avoid butt joints. The trim around doors was a combination of laminated plastic and non-ferrous metal, in satin finish, which together with hardware similarly finished, gave interesting relief to the laminated plastic surfaces.

A simple design of interior was thus made interesting to an extent that would be obtained in ordinary architectural work by the introduction of fine doors and wainscots against plain plaster walls.

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